ONTARIO

COTTAGE POLLUTION STUDY

PART I - Methodology and Study of Three Lakes

by

Consultant and Development Section

Public Health Engineering Service

Public Health Division Environmental Health Branch

ONTARIO DEPARTMENT OF HEALTH

Hon. M. B. Dymond, M.D., C.M.

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S T A F F

Project Engineers	R. Laak, Ph.D. (to August 1967)
	N.A. Chowdhry, P.Eng. Senior Development Engineer
Project Supervisor	N.R. Laxton, C.P.H.I.(C)
Assistant Project Supervisor	W.J. Hogle, C.P.H.I.(C)

S U R V E Y T E A M S

Jack Lake Team	Steenburg Lake Team	Six Mile Lake Team
A.L. Scully	C.H. Boucher	J.A. Wilkins
J.P. Mayer	D.H. Arrell	V. Libis

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ACKNOWLEDGEMENT

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SUMMARY

A pilot study to determine whether cottage waste producing systems were contributing pollution to the lakes was made in the summer of 1967. The objectives of the study were also to find out the effectiveness of the present legislation and enforcement designed to control pollution caused by cottage waste facilities and if disposal methods in use resulted in public health nuisances. No attempt was made to evaluate the lake water quality for recreational or other purposes. The study was the result of a report submitted to the Honourable M. B. Dymond, M.D., Minister of Health, by the Tourist Industry Committee of the Ontario Economic Council.

A survey was conducted of the cottage sanitary facilities on three selected lakes namely, Jack Lake in Peterborough County, Steenburg Lake in Hastings County and Six Mile Lake in the District of Muskoka. The health units responsible for the environmental health inspection services in the areas where the study was conducted indicated their interest and provided cooperation.

For this study 519 premises on the lakes were inspected for the purpose of collecting data. The results of the survey indicated that approximately 9.2% of the domestic sewage disposal systems, 6.3% of all kitchen waste disposal systems and 4.5% of all laundry waste disposal systems were found to be contributing material to the lake. In addition to this many systems were considered to be a public health nuisance within the meaning of The Public Health Act.

The primary reasons that systems were judged unsatisfactory were because of faulty design and insufficient soil cover.

In the case of systems "contributing to pollution" the laboratory reports received from lake water samples collected in the immediate area of the installation were considered in this evaluation.

Where local municipal refuse disposal sites were conveniently available to cottages, private refuse or garbage disposal did not create a problem.

The three health units considered that their programmes of private sewage disposal control at recreational areas were inadequate. It is assumed that many new systems are being established without their knowledge.

Amending local building by-laws to include automatic notification to the health unit when new development is considered and the provision of these by-laws in areas where they do not exist at present would be of benefit in control of this situation.

It is assumed that new property owners may not be aware of the restrictions involved in private sewage disposal. It would appear that these restrictions together with the health units' services should be more fully advertised in order to ensure that all new owners are aware of the law in regard to private sewage disposal. Similar consideration should also be given to individual kitchen and laundry waste disposal systems.

Subdivision control by-laws are of considerable value. Only a few of the townships within the health units studied had such by-laws in effect.

Due to the heavy work load during the summer in recreational areas, in order to provide adequate control over sewage disposal installations, an increase in the inspection staff appears to be necessary.

Consideration should be given to the continuance of the cottage pollution study in 1968. In this way additional lakes in other geographical areas can be studied and further data collected resulting in a more conclusive evaluation.

PART I - INTRODUCTION

Purpose of Study

The cottage pollution study was instituted as a result of a report submitted to the Honourable M. B. Dymond, M. D., Minister of Health, by the Tourist Industry Committee of the Ontario Economic Council. The report is dated May 1966 and draws attention to the suspected pollution of the province's lakes and rivers resulting from summer cottage development.

In part, this document stated "Under present protection programmes at the Municipal, County and Provincial levels there would appear to be insufficient safeguards against pollution originating from inadequate or improperly functioning cottage sewage disposal systems. The Ontario Economic Council suggests for the consideration of governments at all levels a programme, based on the recommendations of the Tourist Industry Committee, which would insure that by 1970 all necessary steps are to be taken to stop pollution from this source."

On August 11, 1966 the Minister of Health, by letter, informed the Council that "The recommendations for a pilot study of the existing cottage waste disposal systems; for an improved co-operation with local officials concerned with cottage developments; and for a review of the subdivision control legislation are all welcomed as useful suggestions for effective action in what is recognized as a problem area of increasing magnitude."

The Public Health Engineering Service was directed to perform the pilot study which would evaluate the problem.

Objectives

The objectives of this pilot study were to determine the effectiveness of the present legislation and enforcement designed to control pollution caused by cottage waste producing systems and if necessary provide suggestions that would ensure adequate control. No attempt would be made to evaluate the lake water for recreational or other purposes.

Preparation

Methods and water pollution indices were considered and established. Decisions were reached regarding the number and type of summer student staff required for field work and the equipment that would be needed. Programme costs were estimated.

During May the lakes to be studied were selected. An attempt was made to ensure that the lakes chosen would represent a random sample of the lakes in the recreational centres of the Province with consideration for differences in location, topography, size and length of time populated. In view of this, Six Mile Lake in the District of Muskoka, Jack Lake in Peterborough County and Steenburg Lake in Hastings County were selected. Discussions were held with the medical officers of health and chief public health inspectors of the health units involved. These officials were agreeable to the study and felt that the information gained from the survey would be of significant value.

It was decided that information obtained from the individual cottagers would be confidential apart from the final report. Six university students who would act as field staff and classified as

"health survey aides" attended an intensive course of instruction between June 1st and June 16th at the Public Health Engineering Service office and field training was included in the last week of instruction. Three field crews each consisting of two health survey aides were formed providing a single crew for each lake to be studied.

The Field Survey

It was the task of the field crew members working as a team to visit and inspect the cottages and commercial establishments along the lake shoreline with the understanding that one general area of shoreline would be completed before moving on to the next. An explanation concerning the nature of the study was outlined in a letter entitled "Notice to Cottage Owners" (Appendix I). Notices would be distributed to cottagers, attached to public billboards and placed in other conspicuous places. Each property would be visited at least twice during the course of the summer.

Each cottage and commercial property owner was interviewed and a data sheet completed by the crew. The individual data sheets (Appendix II) were concerned with domestic sewage disposal, kitchen waste disposal, laundry waste disposal and refuse disposal. Private water supply systems were also evaluated. The finished data sheet would include a complete diagram of the property including dimensions and measurements and the laboratory results of all water samples (bacteriological and chemical) collected from the lake water just off shore in the immediate vicinity of the premises, selecting where

possible, places where sewage effluent might drain into the lake. Other subjects of environmental health significance were also covered in the data sheet. By inspection, interview, laboratory reports, and the use of on-the-spot testing equipment the field crews would be able to locate the incidence of pollution. Each waste producing system at each location was evaluated as satisfactory, as a public health nuisance, or as contributing to environmental pollution. The recommendations contained in the booklet "Septic Tank Systems" concerning distance, sizes, soil quality were not adhered to for the purpose of evaluation. (For example this booklet states that a septic tank system should be located no closer than 50' to a lake or a stream. In this evaluation however, a system could be located less than 50' to a lake without being considered unsatisfactory provided that pollution or a public health nuisance did not occur.) A sample of a completed data sheet is appended to this report. (Appendix III)

Accommodation was provided on the lakes and the only method of transportation used was outboard motor boat. Each crew was visited weekly by a member of the regular staff. In order to ensure that the lake community would receive adequate coverage and surveillance, it was necessary for the individual crews to work throughout the weekends including the two statutory holidays in July and August. Compensating time was given during the week when the cottage population decreased.

Mid-way through the summer it became evident that the Six Mile and Jack Lake crews would be unable to complete all the establishments on their shorelines. Steenburg Lake being relatively smaller with 10 miles of shoreline and 167 establishments would be completed.

Field work on the lakes was terminated on September 1, 1967.

The health survey aides attended the Central Office for a short period of time during September when the raw data collected during the 10 working weeks were compiled into summary form. Each crew was also responsible for completing a crew's report on their activities, their acceptance on the lake, and situations peculiar to the lake. In addition to this, maps were completed showing the areas of the lake where pollution was gaining entrance to the lake water.

The table on pages 7 and 8 indicates the number of waste disposal systems and drinking water supplies inspected at each of the three lakes.

The table on page 9 indicates the distances that toilet and kitchen waste disposal systems were located from the shoreline of the lakes.

Throughout Parts II, III and IV of the report reference is made to the following three classifications as applied to all waste producing systems evaluated at each lake.

1. The classification CONTRIBUTING TO POLLUTION refers to the percentage of systems that could be proven to be contributing material to the lake water.

2. The classification PUBLIC HEALTH NUISANCE refers to the percentage of other systems than those in 1. above where a condition, not known to be contributing to pollution of the lake water, exists which "is or may become injurious or dangerous to health or that

prevents or hinders or may prevent or hinder in any manner the suppression of disease." This quotation is from Section 82 of The Public Health Act.

3. The classification TOTAL SATISFACTORY refers to the total percentage of all the systems inspected and found to be neither public health nuisances nor contributing to pollution.

DATA

Type of Toilet	Six Mile Lake	Steenburg Lake	Jack Lake
Flush	21	49	67
Modified Flush	61	42	22
Pail-A-Day	4	7	14
Pit Privy	66	73	132
Chemical	3	2	0
Others	10	0	0
(Total)	(165)	(173)	(235)
Kitchen Waste Disposal			
Leaching Pits	77	80	145
Surface Disposal	63	50	56
Others	8	0	1
(Total)	(148)	(130)	(202)
Laundry Waste Disposal			
Septic Tank	2	0	4
Leaching Pit	8	7	21
Surface	22	31	33
Lake	1	1	2
(Total)	(33)	(39)	(60)

Note: Combined toilet and kitchen waste disposal systems are included in "toilet disposal systems" and omitted from "kitchen waste disposal systems".

Refuse Disposal	Six Mile Lake	Steenburg Lake	Jack Lake
Burned on Lot	85	36	44
Buried	24	6	11
To Local Dump	30	152	115
To Home	90	7	27
Deposited in Bush	55	0	16
Deposited in Lake	0	0	2
(Total)	(284)	(201)	(215)
Drinking Water Supply and Treatment			
Source			
Lake	96	49	48
Cottage Well	1	15	61
Spring	1	3	2
Home	73	75	39
Local Town	8	18	16
Cistern	0	0	1
(Total)	(179)	(160)	(167)
Treatment			
Filtered	18	14	21
Disinfected	82	28	16
No Treatment	11	33	67

Distance From the Lake	Number of Disposal Systems					
	Six Mile Lake		Steenburg Lake		Jack Lake	
	Toilet	Kitchen	Toilet	Kitchen	Toilet	Kitchen
0' - 50'	43	81	42	73	65	76
51' - 75'	41	31	32	22	46	21
76' - 100'	26	15	48	28	43	13
101' - 150'	32	16	21	7	16	7
151' - 200'	13	4	5	0	6	3
Unknown	10	1	25	0	59	89
(Total)	(165)	(148)	(173)	(130)	(235)	(209)

*Combined toilet and kitchen waste disposal systems are included in "toilet disposal systems" and omitted from "kitchen waste disposal systems".

PART II - THE STUDY OF JACK LAKE

Sources of Information - Peterborough County-City Health Unit
- Lake Ontario Development Association
- Department of Lands and Forests, Silviculture Branch
- Jack Lake Cottage Owners' Association
- Jack Lake Land Company
- Property Owners

Location

Jack Lake is situated in the north-eastern section of Peterborough County approximately 3 miles via a township road south of the Hamlet of Apsley. A small part of the western portion of the lake is located in Burleigh Township while the majority of the shoreline is within the Township of Methuen.

Topography

The Jack Lake area provides approximately 48 miles of shoreline. The lake is roughly divided into a northern and a southern section connected by a channel called "The Narrows". Both sections contain many bays and islands of varying sizes. The lake is fed by several small streams and underground springs.

The shoreline of the lake is irregular and rocky, typical of the Precambrian Shield. In most cases the shoreline rises rather steeply from the water line. Soil is sandy loam and varies from several inches to a few feet in depth, however, the average depth of soil is

less than 5 feet. Many islands are found in the lake, most being well elevated above lake level and rising sharply from the shoreline to a plateau or to a peak. In most cases the entire land area is heavily treed.

Part of the north shore of the north-western section and part of the eastern shore of the north-eastern section do not conform to the general rocky undulating characteristics of the lake. In these areas the land is low and the soil sandy. The water table in this portion is very high, usually only 2 feet below the surface especially in those areas where cottages have been constructed on filled swamp land. It was observed that in the spring and following heavy rains this land became practically flooded.

Population and Distribution

There is a total of 350 establishments on the lake, 345 being cottages and the remaining 5 are commercial establishments. The summer cottage development extends around most of the shoreline but the greatest concentration exists in the northern portion of the lake.

By nationality perhaps 70% of the population is Canadian and 30% American.

Transportation of persons, supplies and materials at the lake is completely by boat since there are no roads circumventing the shoreline. A single township road extending south from Apsley

terminates at the government dock located on the north shore of the lake at Brook's Bay. All activity on the lake begins on the north shore.

Acceptance by Population

Excellent co-operation was extended by the cottagers who for the most part were pleased that the government was implementing steps towards preserving the natural quality of waters of the Province. Some, however, expressed regret that enforcement was not part of the programme.

Weather and Water Levels

The weather was extremely variable with no sustained warm, dry and sunny periods. Cool weather and excessive rainfall characterized the summer months.

Heavy rainfall in the spring and early summer was responsible for unusually high lake water levels. Jack Lake is a tributary of the Trent Canal System and the water level is regulated by a dam located at the south-eastern periphery of the lake. The Trent System was seriously flooded during late June and July. This condition prevented normal flows from leaving the lake during this period. On the 21st of July the water level began to drop and by the 14th of August it was only approximately 6 inches above seasonal normal.

This prolonged period of high water created a higher ground water table than usual throughout June and July and it is believed that this condition contributed to pollution in the low lying areas.

Organization in the Lake Community

(a) Local Cottagers Association - Membership in this Association is subject to the applicant owning land on the lake and paying an annual fee. Members are requested to obey the Association's sanitary regulations which are available to all members in poster form.

A modified pollution survey leaning heavily on bacteriological laboratory reports of lake water is usually conducted annually by members of the Association. On occasion the Association has forced cottagers to take steps such as moving privies they believed to be too close to the shoreline.

(b) The Land Company - The Land Company was formed and is owned by several of the cottagers on the Lake and has control of approximately 80% of the available undeveloped land on Jack Lake.

The Land Company has purchased some lots and islands that are unsuitable for cottages with the intention of holding these properties from the market and thus protecting the lake water quality and property values. The charter of the company states that the company was formed to preserve Jack Lake as a recreational community. Sale contracts require the buyer to purchase at least 500' of frontage, to obey the Association's sanitation regulations and to build a particular type of cottage. If a purchaser fails to comply with any clause of the contract the contract is broken and the land is to revert to the Company.

Because of these requirements it appears that crown land and land reclaimed by depositing fill material are being developed at a faster rate.

Relations with Local Officials

In general, the cottagers expressed concern regarding the level of services and what they considered to be a lack of interest provided by the township and the county in such fields as land sales, refuse disposal and water pollution.

Due to the presence of the Health Survey Aides on the lake during the past season a renewed interest was noted regarding the enforcing of the Association's sanitary regulations. Cottagers also became more knowledgeable concerning the function of the health unit.

PETERBOROUGH COUNTY-CITY HEALTH UNIT

The Peterborough County-City Health Unit was formed in 1965 and has jurisdiction over 19 municipalities and a population of approximately 80,000. Four public health inspectors and a chief inspector are responsible for carrying out the environmental health programme. It is estimated that 75% of the total time during the summer months is devoted to recreational sanitation matters.

Due to greatly increased work loads in all fields of environmental health during the tourist season the health unit is not able to carry out inspections and surveys on a routine basis and therefore its activity at cottage areas is on a demand basis only. It is felt that a significant increase in staff would be mandatory if the Health Unit's activity at recreational areas increased.

Section 14, Schedule B of The Public Health Act requires that the approval in writing of the medical officer of health be obtained before a private sewage disposal system is established. One municipality within Peterborough County has availed itself of a septic tank by-law. The Peterborough County-City Health Unit requires that a permit be issued for new private sewage disposal systems and that each system be inspected. The Health Unit relies on owners, builders and contractors to approach the Health Unit for inspection and advice when the installation of a private sewage disposal system is planned. Municipal clerks are requested to direct all new property owners to the Health Unit for consultation in these matters when building permits are obtained.

The Health Unit reports that this method of approach is only partially satisfactory since it relies on the integrity of the owner or builder and the interest of the Municipal Clerk.

This policy also presupposes that new property owners are knowledgeable of the law relating to private sewage disposal, although these laws are not publicized by means of the mass media or in poster form.

Due to the variable topography and soil characteristics at cottage areas, and because numerous lakes are without road access, compromises in design, size and location are often necessary when considering private sewage disposal systems. The Health Unit reports that the application of the recommendations contained in the department's booklet "Septic Tank Systems" is less practical in cottage areas than it has proven to be in urban and suburban developments.

A public health inspector from the Peterborough County-City Health Unit visits Jack Lake weekly to answer specific requests for assistance and to inspect new sewage disposal systems when the installation of such systems is known.

SANITARY SURVEY RESULTS - JACK LAKE

Page 17 provides a statistical summary of the data collected on Jack Lake concerning the evaluation of:

(a) Private sewage disposal systems (235 systems observed)

(b) Kitchen waste disposal systems (202 systems observed)

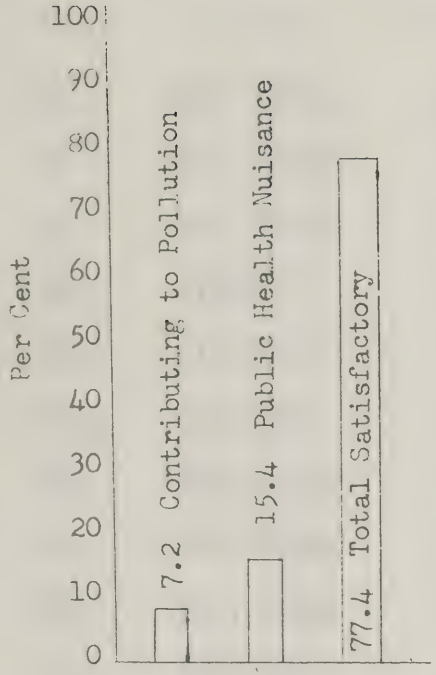
(c) Laundry waste disposal systems (60 systems observed)

(d) Private refuse disposal practices (215 practices observed).

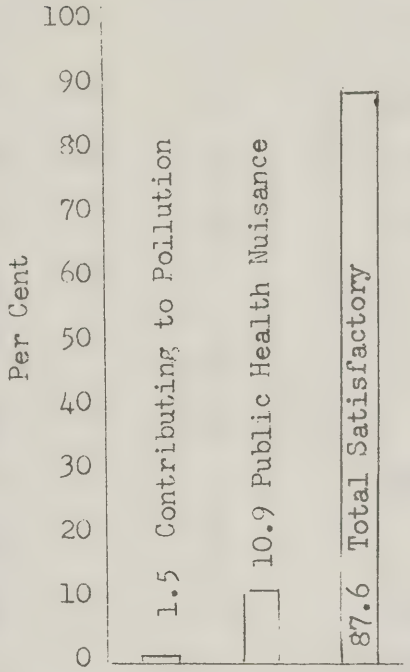
Pages 18 to 26 give details of the systems causing pollution or public health nuisances.

JACK LAKE

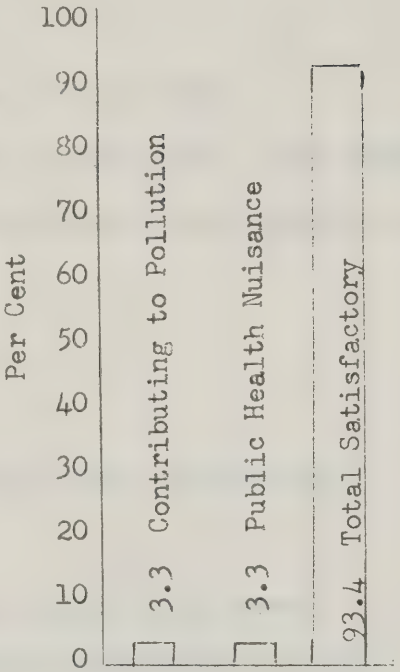
(An Evaluation of Waste Producing Systems)



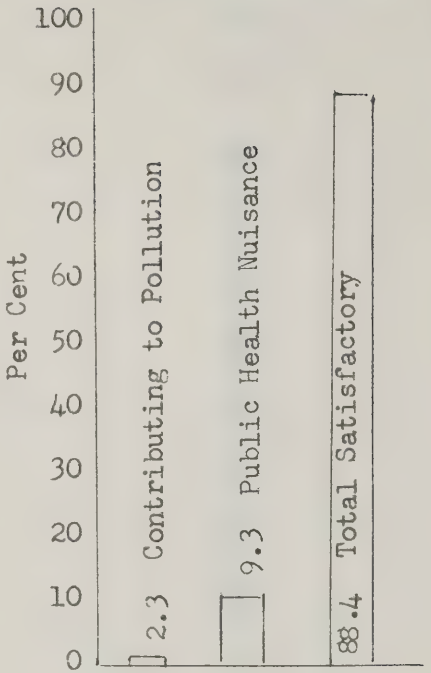
*Private Sewage Disposal Systems (Total Systems = 235)



Kitchen Waste Disposal Systems (Total Systems = 202)



Laundry Waste Disposal Systems (Total Systems = 60)



Private Refuse Disposal Practices (Total Practices = 215)

JACK LAKE

Toilet Waste

Sampling Location	System	Distance from Lake in Feet	Soil Depth Less than 5 Feet	Remarks	Pollution (P) or P.H. Nuisance (N)
10	Mod. Flush	40		Draining to lake	P
12	Pit Privy	170			N
15	Pit Privy	5	X	Draining to lake	P
17A	Pit Privy	70			N
21A	Pail-a-day	40		Draining to lake, Poor design	P
21B	Pail-a-day	30		Close to lake, Poor design	P
21C	Pail-a-day	30	X		N
21D	Pail-a-day	5	X	Close to lake, surface wet	P
22B-C	Pit Privy	80	X		N
22D	Pit Privy	80	X		N
22A	Flush	150			N
25	Mod. Flush	65	X	Close to water table, Surface wet	P
26	Mod. Flush	45	X	Close to water table, Poor design	P
27	Mod. Flush	100	X	Close to water table	P

Sampling Location	System	Distance from Lake in Feet	Soil Depth Less than 5 feet	Remarks	Pollution (P) or P.H. Nuisance (N)
28E	Pit Privy	170			N
28G	Pit Privy	130			N
28H	Pit Privy	130			N
28I	Pit Privy	90			N
28J	Pit Privy	90			N
28K	Pit Privy	90			N
28L	Pit Privy	90			N
28M	Pit Privy	90			N
29	Pit Privy	120	X		N
30	Pit Privy	95	X		N
32	Pit Privy			Close to water table	P
33	Pit Privy	70		Close to water table	P
34	Pit Privy	70		Close to water table	P
38	Pit Privy	70	X		N
38	Flush	70	X	Insufficient soil cover, Poor design	P

Sampling Location	System	Distance from Lake in Feet	Soil Depth Less than 5 Feet	Remarks	Pollution (P) or P.H. Nuisance (N)
41	Pit Privy	70			N
42	Flush	20		Close to lake	P
43	Flush	40		Insufficient soil cover, Close to lake	P
44	Pit Privy	20	X	Insufficient soil cover, Close to lake	P
56	Pit Privy	66			N
56Y	Pit Privy	200			N
74	Flush	75			N
76	Flush	70			N
80	Pit Privy	60	X		N
84	Pit Privy	70			N
85	Pit Privy	120			N
86	Pit Privy	120			N
90	Pit Privy	60	X		N
96	Pit Privy	70			N
127	Pit Privy	80			N

Sampling Location	System	Distance From Lake in Feet	Soil Depth Less than 5 Feet	Remarks	Pollution (P) or P.H. Nuisance (N)
139	Flush	50			N
155	Pit Privy	60			N
157	Pit Privy	20	X		N
165	Pit Privy	90			N
172	Pit Privy	75			N
177	Pit Privy	20	X	Insufficient soil cover, Close to lake	P
177A	Pit Privy	10		Close to lake	P
188	Mod. Flush	50	X		N
189	Pit Privy	80			N

JACK LAKE

Kitchen Waste

Sampling Location	System	Distance from Lake in Feet	Soil Depth Less than 5 Feet	Remarks	Pollution (P) or P.H. Nuisance (N)
15	Surface	100	X		N
21A	Surface	30	X		N
21B	Surface	20	X		N
21D	Surface	20	X		N
22D	Leaching Pit	25	X	Insufficient soil cover, Close to water table and lake	P
24H	Surface	200			N
25	Leaching Pit	50	X		N
28H	Surface	100			N
28I	Surface	60			N
28J	Surface	60			N
28K	Surface	60			N
28L	Surface				N
28M	Surface	60			N
32	Surface	20	X		N

Sampling Location	System	Distance from Lake in Feet	Soil Depth Less than 5 Feet	Remarks	Pollution (P) or P.H. Nuisance (N)
37	Surface	55	X		N
39	Leaching Pit	40	X		N
47	Surface	30			N
53	Surface	30			N
76	Leaching Pit	70			N
85	Surface	30			N
99	Surface	80			N
105	Surface	25			N
145	Surface	10	X	Insufficient soil cover, Close to lake	P
175	Surface	10	X		N
177	Leaching Pit	8	X	Insufficient soil cover, Close to lake	P
187	Surface	70			N

JACK LAKE

Laundry Waste

Sampling Location	Method	D I S P O S A L				Remarks	Pollution (P) or P.H. Nuisance (N)
		Septic Tank	Leaching Pit	Surface	Lake		
134	Manual	-	-	-	X	Washing in lake	P
157	Machine	-	-	X	-		N
165	Machine	-	-	X	-		N
172	Manual	-	-	-	X	Washing in lake	P

JACK LAKE

Solid Waste

Sampling Location	D I S P O S A L						Remarks	Pollution (P) or P.H. Nuisance (N)
	Burned	Buried	Local Dump	Home	Deposited in Bush	Lake		
4	X	-	-	-	-	X	Dumped into lake	P
9	X	-	-	-	-	-		N
17B	X	-	X	-	-	-		N
18	X	-	-	-	-	-		N
20	-	-	-	-	X	-		N
27	X	-	-	-	-	-		N
29	X	-	-	-	-	-		N
32	-	-	-	-	X	-	Deposited on lot and drains into lake	P
34	X	-	-	-	-	-	Partly burnt, drains into lake	P
37	X	-	-	-	-	-		N
39	X	-	-	-	-	-		N
41	X	-	X	-	-	-		N

Sampling Location	D I S P O S A L						Remarks	Pollution (P) or P.H. Nuisance (N)
	Burned	Buried	Local Dump	Home	Deposited in Bush	Lake		
44	-	X	-	-	-	-	Drains to the lake	P
81	-	-	-	X	X	-		N
84	X	-	-	-	-	-		N
85	X	-	X	-	-	-		N
90	X	-	-	-	-	-		N
101	-	-	-	-	X	-		N
130	-	-	-	-	X	-		N
155	-	-	-	-	X	-		N
158	-	-	X	-	X	X	Deposited in lake	P
162	-	-	X	-	X	-		N
187	X	-	-	-	-	-		N
189	X	-	-	-	-	-		N
191	X	X	-	-	X	-		N
192	-	-	-	-	X	-		N

Inspections of 196 premises, including 5 commercial establishments, were completed along 15 miles of shoreline on Jack Lake. However, it should be pointed out that these figures need have no positive bearing on the number of systems observed. For example, a single cottage may have a privy as well as a septic tank and if the cottage is used only on weekends there may be no provision for laundry.

The graph on page 17 indicates that 7.2% of all private sewage disposal systems; 3.3% of all laundry waste disposal systems; 2.3% of the total refuse disposal practices and 1.5% of all kitchen waste disposal systems were contributing to pollution.

The graph on page 29 indicates the types of sewage disposal systems encountered and the number and percentage of each type contributing to water pollution or causing a public health nuisance.

The graph on page 29 shows that septic tank systems were the main contributors of pollution at this lake while privies were responsible for the majority of public health nuisances.

A map of Jack Lake indicating the area of the lake studied is found on page 30.

The statistics relating to the collection of lake water samples, both bacteriological and chemical will be included later in this report.

JACK LAKE

Break Down of Private Sewage Disposal Systems

Type of System	Number	% of Total Systems	No. Contributing to Pollution	% of Type	No. of Public Health Nuisances	% of Type	Total Number	Unsatisfactory %
Septic Tank	103	43.8	10	9.7	6	5.8	16	15.5
Privy	132	56.2	7	5.3	30	22.7	37	28.0
Other	0	0	0	0	0	0	0	0
Total	235	100.0%	17	N/A	36	N/A	53	N/A

Percentage of Total Systems Contributing to Pollution $\frac{17}{235} = 7.2\%$

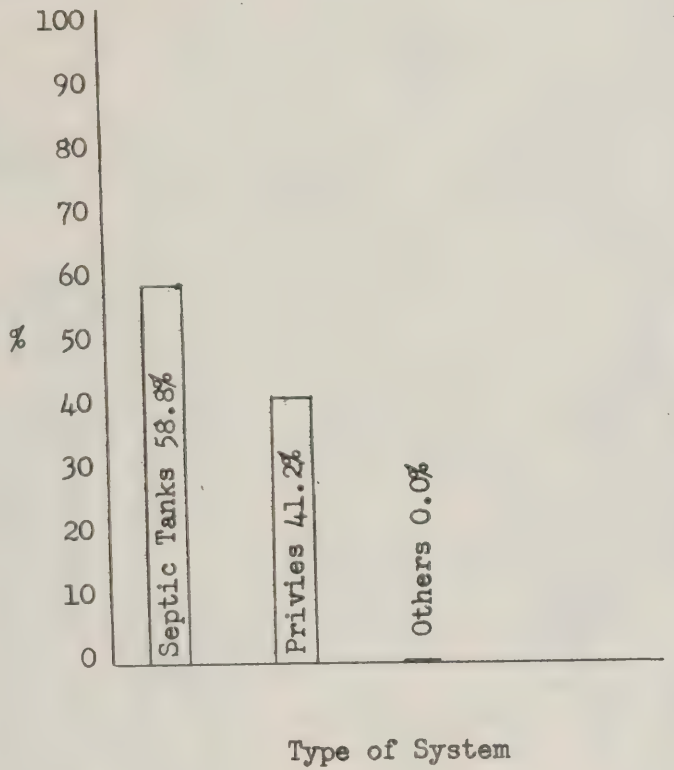
Percentage of Total Systems Causing a Public Health Nuisance $\frac{36}{235} = 15.3\%$

Percentage of Total Systems Unsatisfactory $\frac{53}{235} = 22.6\%$

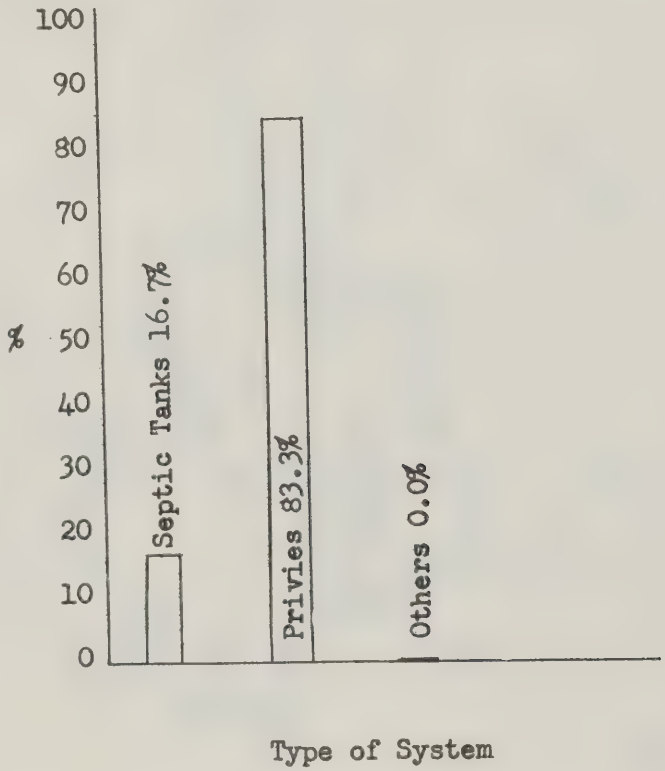
JACK LAKE

Breakdown of Private Sewage Disposal Systems

Percentage by which the Different Types of Systems Contributed to Pollution
(17 systems Contributing to Pollution = 100%)



Percentage by which the Different Types of Systems Caused Public Health Nuisances
(36 systems Causing Public Health Nuisances = 100%)




N
JACK LAKE
COTTAGE POLLUTION SURVEY
1967
Public Health Engineering Service
shoreline studied
(islands included)

PART III - THE STUDY OF STEENBURG LAKE

Sources of Information - Hastings and Prince Edward Counties Health Unit
- Department of Lands and Forests; District Foresters Office; Silviculture Branch
- Steenburg Lake Cottagers Association
- Property Owners.

Location

Steenburg Lake is a relatively small body of water on the borders of Limerick and Tudor Townships in the northern part of Hastings County. It is approximately 20 miles south of the Town of Bancroft and 1 mile west of Highway #62.

Topography

This lake has approximately 10 miles of shoreline and consists of three principle bays with many islands of varying sizes. It is reported that Steenburg Lake is mainly spring fed however one major stream and a number of smaller streams and marshes feed the lake intermittently. The outlet is a slow moving stream which flows into Limerick Lake 5 miles to the east.

The southern and eastern shorelines are irregular and hilly. Individual lots in this area may contain large outcroppings of bedrock and the soil depth may vary from nil to pockets several feet in depth. The northern and western shores are reasonably level and contain a fair depth of soil cover, however, in most cases this depth is less than 5 feet. A substantial tree growth is supported by the sandy soil which appears to have good absorption qualities.

Population and Distribution

There are 167 establishments on the lake, two of these being commercial establishments. Summer cottage development surrounds the majority of the shoreline with the exception of a large peninsula which consists of approximately 3 miles of shoreline in the south-western portion of the lake. This peninsula is referred to locally as "The Headland".

In most cases cottagers are able to drive to their cottage without relying on water transport.

The majority of cottagers are Canadian citizens, and residents of local towns. The Toronto-Hamilton area, and the Ottawa area are also represented. Approximately 5% of the lake population are American citizens from New York State.

Acceptance by Population

The survey was very well accepted by the lake community. Most of the cottagers, if not all, were concerned about water pollution and their only regret was the lack of enforcement involved in this study.

Weather and Water Levels

Varying amounts of rain fell practically every day during June and July. August, however, was more variable with less rain.

During June and July the lake water levels varied from 12 to 16 inches above seasonal normal. It was observed that any heavy rainfall was capable of noticeably raising lake water levels for short periods of time. This condition would lead to a raising of the ground water table which could affect the operation of sub-surface waste disposal systems.

Organizations in the Lake Community

(a) The Cottagers' Association - This body is reported to be quite strong commanding the full support of the cottagers. The Association apparently does not attempt to enforce public health standards itself, but forwards complaints to the local health agency.

Of primary concern to the Association is the possible subdivision of the large undeveloped peninsula referred to as "The Headland".

(b) Local Governments of Limerick and Tudor Townships- There appeared to be some evidence of a conflict between the summer cottagers and the local township councils, notably over the locations of two township dumps situated near the lake.

In the past, prior to the formation of the Health Unit, Limerick Township attempted to enforce some public health measures through a local building or plumbing inspector. One measure consisted of having all privies moved at least 100 feet from the lakeshore.

THE HASTINGS AND PRINCE EDWARD COUNTIES HEALTH UNIT

The Hastings County Health Unit was formed in September 1966. During 1967 the unit combined with the already established Prince Edward County Health Unit to form the Hastings and Prince Edward Counties Health Unit, giving full time health services to 39 municipalities with a total population of approximately 110,000

people. Five public health inspectors and a chief inspector are responsible for implementing the environmental health programme.

There are about 150 lakes within the health unit area and this wealth of recreation resource results in a great increase in the population of the counties during the tourist season at a time when workloads are normally increased in all fields of environmental sanitation. Because of this, inspectional services at recreation areas are necessarily on a demand basis with minimum routine surveillance being given. Approximately 30% of the inspectors' time is spent on recreational sanitation matters during the summer season.

All municipalities within the unit have building by-laws. The enforcement of these by-laws, however, is considered to be highly variable. Subdivision control by-laws are in force in 12 townships. No municipalities within the health unit have passed sewage disposal by-laws amending the statutory by-law in effect under Schedule B of The Public Health Act.

The Health Unit requires that a permit be issued prior to the installation of a new septic tank system or the replacement of an old one. Application forms are available from the health unit office and at the office of each municipal clerk. When a new owner secures a building permit, the clerk will, in most cases, ask whether a septic tank system will be installed. If such a system is planned,

the clerk will forward completed application forms to the health unit. If the owner is not immediately planning to install a water carried sewerage system, no notification is forwarded to the Health Unit. The installation of other sewage disposal systems such as privies and kitchen waste water systems are not normally referred to the Health Unit. The Health Unit estimates that 75% of all new septic tank systems and approximately 20% of the renovated systems at cottage areas are presently being inspected.

The Health Unit indicates that it is practically impossible to apply the recommended standards contained in the booklet "Septic Tank Systems" at cottage areas. It is often necessary to compromise in size, design and location of new septic tank systems. Opinion was expressed that strict enforcement of present recommended standards would greatly restrict cottage development and lead to more serious problems of controlling installations through evasion.

The County of Hastings is studying a county wide building by-law which will include automatic notification of the health unit regarding the installation of private sewage disposal systems.

The law relating to sewage disposal and the position of the health unit is advertised in local newspapers during the tourist season. The results from this practice are limited and the health unit is considering advertising in poster form in the future. It is felt that additional staff, part-time or permanent, would be required if a total programme of private sewage disposal control was implemented in recreational areas.

SANITARY SURVEY RESULTS - STEENBURG LAKE

A statistical summary of the data collected at Steenburg Lake during the survey is outlined on page 37 under the following established catagories.

(a) Private Sewage Disposal Systems (173 systems observed)

(b) Kitchen Waste Disposal Systems (130 systems observed)

(c) Laundry Waste Disposal Systems (39 systems observed)

(d) Private Refuse Disposal Practices (201 practices observed)

One hundred and fifty-nine premises including 2 commercial establishments were visited along the 10 miles of shoreline. Two cottages could not be fully evaluated since they were not inhabited during the summer.

Again the figures for establishments completed and systems observed need have no direct correlation since some cottages have more than one sewage disposal system and some cottages have no laundry waste disposal system.

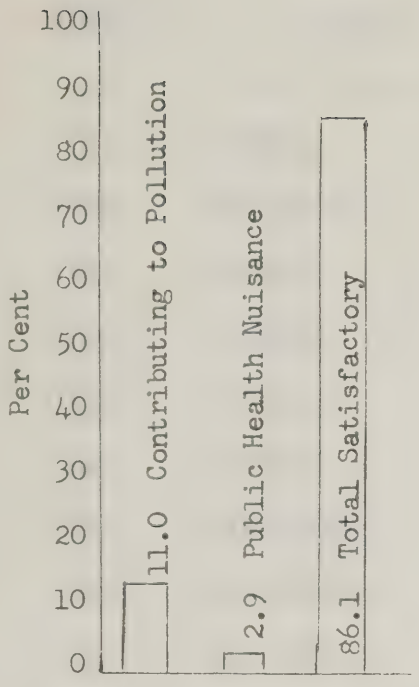
The graph on page 37 (an evaluation of waste producing systems) indicates that 11.0% of private sewage disposal systems, 7.7% of the kitchen waste disposal systems and 5.1% of the laundry waste disposal systems were contributing to pollution.

Steenburg Lake was completed in total. A map of the lake is found on page 51.

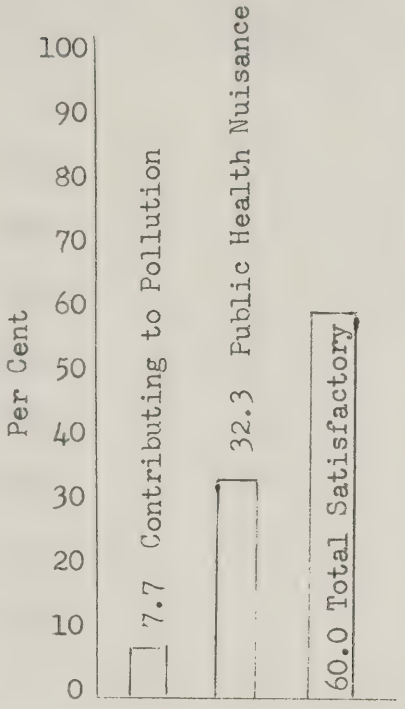
The details of systems causing pollution or public health nuisance are shown on pages 38 to 47.

STEENBURG LAKE

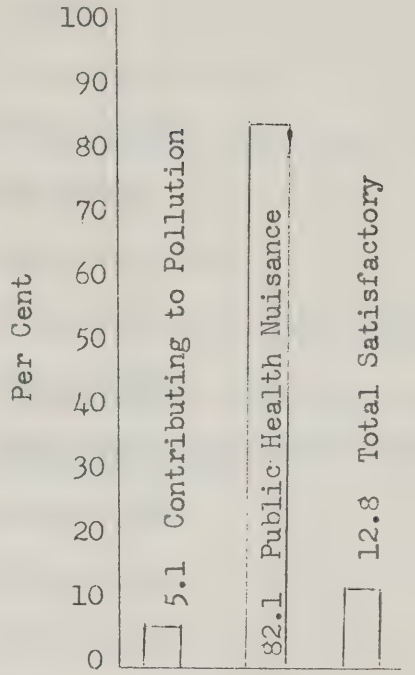
(An Evaluation of Waste Producing Systems)



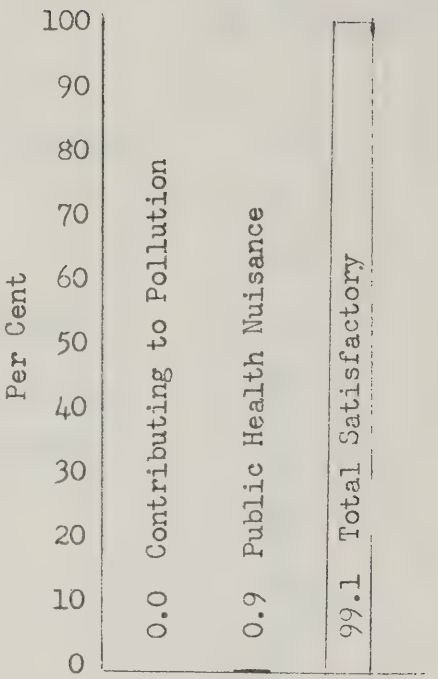
*Private Sewage Disposal Systems (Total Systems = 173)



Kitchen Waste Disposal Systems (Total Systems = 130)



Laundry Waste Disposal Systems (Total Systems = 39)



Private Refuse Disposal Practices (Total Practices = 201)

STEENBURG LAKE

Toilet Waste

Sampling Location	System	Distance from Lake in Feet	Soil Depth Less than 5 feet	Remarks	Pollution (P) or P.H. Nuisance (N)
6	Mod. Flush	40	X	Insufficient soil depth, Poor design	P
7	Flush	20		Close to lake	P
8	Flush	15	X	Insufficient soil depth, Close to lake	P
11	Pit Privy	100		Draining to lake	P
19A	Pail-a-day	35		Close to lake	P
20	Mod. Flush	20		Close to lake	P
29	Pit Privy	2		Close to lake	P
32	Pit Privy	2		Close to lake	P
33	Pit Privy	2		Close to lake	P
37	Flush	30	X	Insufficient soil cover, Close to lake	P
39	Flush	15		Close to lake	P
54	Flush	25	X	Insufficient soil cover, Close to lake	P
55	Flush	80		Draining to lake	P
60B	Mod. Flush	90		Poor design	P
66	Flush	30		Close to lake	P

Sampling Location	System	Distance from Lake in Feet	Soil Depth Less than 5 feet	Remarks	Pollution (P) or P.H. Nuisance (N)
77	Mod. Flush	100	X	Draining to lake	P
97	Flush	30	X	Insufficient soil cover, Close to lake	P
107	Flush	100	X		N
110	Flush	50			N
111	Flush	30			N
122	Flush	40	X	Insufficient soil cover, Close to lake	P
123	Flush	50		Close to stream	P
151	Pit Privy	100	X		N
152	Pit Privy	150			N

STEENBURG LAKE

Kitchen Waste

Sampling Location	System	Distance from Lake in Feet	Soil Depth Less than 5 Feet	Remarks	Pollution (P) or P.H. Nuisance (N)
3	Surface				N
4	Surface				N
5	Surface	0		Draining to lake	P
6	Surface	50	X		N
8	Surface	25	X		N
9	Surface	50			N
11	Surface	60		Draining to lake	P
12	Surface	75			N
13	Surface	60			N
14	Surface	100	X		N
16	Surface		X		N
18	Leaching Pit	3		Close to lake	P
19B	Surface				N
20	Surface	0		Draining to lake	P

Sampling Location	System	Distance from Lake in Feet	Soil Depth Less than 5 Feet	Remarks	Pollution (P) or P.H. Nuisance (N)
24	Surface	20			N
29	Surface	0		Draining to lake	P
31	Surface	40			N
32	Surface	20	X	Draining to lake	P
36	Surface	0		Draining to lake	P
39	Leaching Pit	15		Close to lake	P
41	Surface	150			N
48	Surface	125			N
51	Surface				N
55	Surface	80	X	Draining to swamp then to lake	P
60B	Surface				N
63	Surface	60	X		N
71	Surface	0		Draining to lake	P
74	Surface	100			N
79	Surface	75			N

Sampling Location	System	Distance from Lake in Feet	Soil Depth Less than 5 Feet	Remarks	Pollution (P) or P.H. Nuisance (N)
80	Surface	70	X		N
87	Surface	90			N
88	Surface				N
91	Surface	25			N
91B	Surface				N
105	Surface				N
112	Surface	80			N
118	Surface	50			N
122	Surface	50	X		N
125	Surface	110			N
127	Surface	50			N
128	Surface	110			N
133	Surface	80	X		N
138	Surface	80			N
143	Surface	75			N

Sampling Location	System	Distance from Lake in Feet	Soil Depth Less than 5 Feet	Remarks	Pollution (P) or P.H. Nuisance (N)
151	Surface				N
153	Surface	20			N
154	Surface		X		N
155	Surface	120			N
159	Surface				N
160	Surface				N
162	Surface	100			N
165	Leaching Pit	90			N

STEENBURG LAKE

Laundry Waste

Sampling Location	Method	D I S P O S A L				Remarks	Pollution (P) or P.H. Nuisance (N)
		Septic Tank	Leaching Pit	Surface	Lake		
1	Machine	-	-	X	-		N
8	Machine	-	-	X	-		N
9	Machine	-	-	X	-		N
19A	Machine	-	-	-	X	Washing in lake	P
24	Machine	-	-	X	-		N
25	Machine	-	-	X	-		N
31	Machine	-	-	X	-		N
33	Machine	-	-	X	-		N
34	Machine	-	-	X	-		N
35	Machine	-	-	X	-		N
38	Machine	-	-	X	-		N
40	Machine	-	-	X	-		N
41	Machine	-	-	X	-		N
43	Machine	-	-	X	-		N

Sampling Location	Method	D I S P O S A L				Remarks	Pollution (P) or P.H. Nuisance (N)
		Septic Tank	Leaching Pit	Surface	Lake		
45	Machine	-	-	X	-		N
48	Machine	-	-	X	-		N
62	Machine	-	-	X	-		N
63	Machine	-	-	X	-		N
74	Machine	-	X	-	-		N
77	Machine	-	-	X	-		N
78	Machine	-	-	X	-		N
83	Machine	-	-	X	-		N
90	Machine	-	-	X	-		N
91	Machine	-	-	X	-		N
95	Machine	-	-	X	-		N
96	Machine	-	-	X	-		N
107	Machine	-	X	-	-	Draining to lake	P
138	Machine	-	-	X	-		N
139	Manual	-	-	X	-		N

Sampling Location	Method	D I S P O S A L				Remarks	Pollution (P) or P.H. Nuisance (N)
		Septic Tank	Leaching Pit	Surface	Lake		
140	Machine	-	-	X	-		N
142	Manual	-	-	X	-		N
145	Machine	-	-	X	-		N
147	Machine	-	-	X	-		N
152	Machine	-	-	X	-		N
157	Machine	-	-	X	-		N

STEENBURG LAKE

Solid Waste

Sampling Location	D I S P O S A L						Remarks	Pollution (P) or P.H. Nuisance (N)
	Burned	Buried	Local Dump	Home	Deposited in Bush	Lake		
57	-	X	-	-	-	-		N
80	X	-	X	-	-	-		N

The table on page 49 indicates the types of sewage disposal systems encountered and the number and percentage of each type contributing to water pollution or causing a public health nuisance.

The graph on page 50 provides a further breakdown of the private sewage disposal systems contributing to pollution or causing public health nuisance.

Statistics relating to the laboratory results of lake water samples, bacteriological, chemical and biochemical, will be included later in this report.

None of the private refuse disposal practices were considered to be contributing to pollution and this appears to be a direct result of the fact that 96.0% of all cottagers made use of the two conveniently located municipal dumps.

STEENBURG LAKE

Break Down of Private Sewage Disposal Systems

Type of System	Number	% of Total Systems	No. Contributing to Pollution	% of Type	No. of Public Health Nuisances	% of Type	Total Number	Unsatisfactory %
Septic Tank	98	56.6	15	15.3	3	3.1	18	18.4
Privy	71	41.0	4	5.6	2	2.8	6	8.5
Chemical	2	1.2	0	0	0	0	0	0
Other	2	1.2	0	0	0	0	0	0
Total	173	100.0%	19	N/A	5	N/A	24	N/A

Percentage of Total Systems Contributing to Pollution $\frac{19}{173} = 11.0\%$

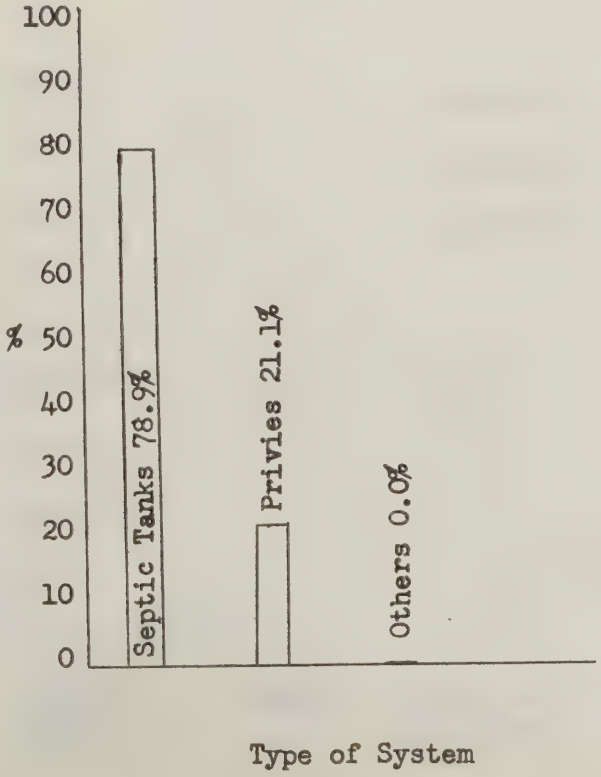
Percentage of Total Systems Causing a Public Health Nuisance $\frac{5}{173} = 2.9\%$

Percentage of Total Systems Unsatisfactory $\frac{24}{173} = 13.9\%$

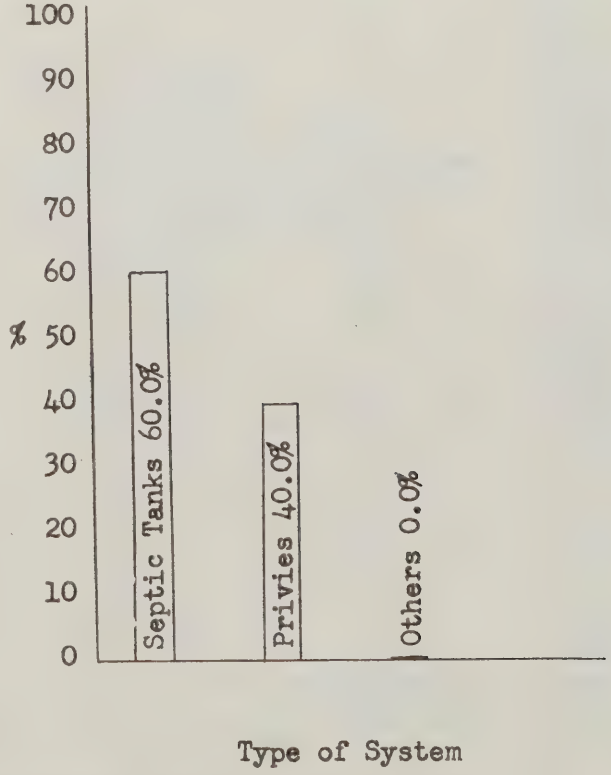
STEENBURG LAKE

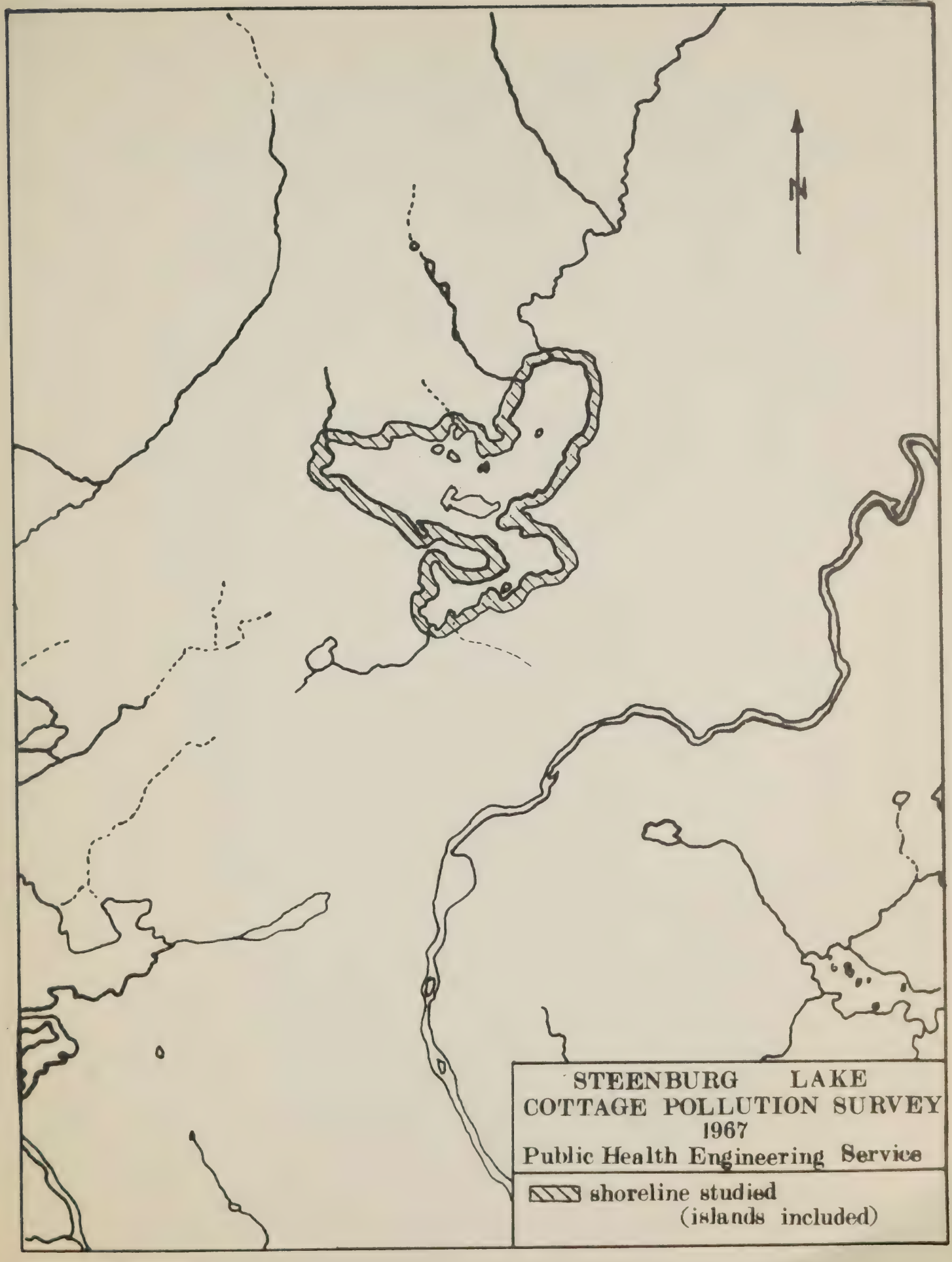
Breakdown of Private Sewage Disposal Systems

Percentage by which the Different Types of Systems Contributed to Pollution
(19 systems Contributing to Pollution = 100%)



Percentage by which the Different Types of Systems Caused Public Health Nuisances
(5 systems Causing Public Health Nuisances = 100%)




N
STEENBURG LAKE
COTTAGE POLLUTION SURVEY
1967
Public Health Engineering Service
shoreline studied
(islands included)

PART IV - THE STUDY OF SIX MILE LAKE

Sources of Information - Muskoka and District Health Unit
- Department of Lands and Forests, Unit Forester, Coldwater
- Six Mile Lake Cottage Association
- Property Owners.

Location of Lake

Six Mile Lake is located in the District of Muskoka, one-quarter of a mile east of Highway 103 and 21 miles north of the Village of Coldwater. The lake is mainly situated in Baxter Township with a small section in the Township of Gibson. The lake consists of many bays and separated areas of water rather than a great expanse of open water. Crooked Bay and Long Lake are situated in the north-western portion, with Six Mile Lake proper in the central portion and Hungry Bay in the north-east. Many islands and peninsulas separate these areas resulting in narrow channels connecting the bays. There are two dams in the south and one in the north. The lake drains into Georgian Bay in the north and the Severn River and Gloucester Pool in the south. It has two major inlets, Pretty Channel and Lost Channel in the south-east corner of the lake.

Topography

Six Mile Lake has typical Georgian Bay characteristics found north of the Severn River in the Precambrian Shield country. The shoreline is irregular with many granite rock outcroppings.

The terrain consists of a few inches of topsoil and a base of hardpan. Most of the topsoil is found in small depressions between the rock ridges. Areas of marshland are found around the shoreline of the lake. The water table was generally well below the ground surface.

Weather and Water Levels

The weather at the lake was extremely variable. There was no sustained warm, dry and sunny period. The summer was cool with a great deal of rain. Heavy rains in the spring and early summer were responsible for unusually high water levels. The water level rose to 12 inches above seasonal normal several times during the summer following heavy rain periods.

Population Distribution

There are about 750 cottages on the lake and 5 commercial establishments. A total of 162 cottages and 2 commercial establishments were visited during the sanitary survey. The majority of the cottagers were Canadian citizens and residents of Toronto. Approximately 3% were American citizens, from the State of New York.

Local Organizations

The Cottage Association is active at the lake and officials of the Association were contacted prior to and during the survey. A modified pollution survey in the form of a lake water sampling programme has been conducted annually by members of the Association.

Because Baxter and Gibson Townships have no municipal organization there is no opportunity for the cottage owners to have

contact with a local municipal council. The Muskoka Health Unit officials and Provincial government departments are the agencies responsible for the supervision of the area and for providing any assistance requested by the Cottage Association or individual cottagers.

MUSKOKA AND DISTRICT HEALTH UNIT

The Muskoka and District Health Unit has jurisdiction over 4,000 square miles. There are 45 townships (9 are without municipal organization) which support a resident population of 37,000. During the summer months this population is reported to increase to over 200,000.

Four public health inspectors, a chief inspector and two summer assistants are responsible for carrying out the environmental health programme. It is estimated that approximately 90% of the inspectors' time during the summer season is spent on recreational sanitation matters of a demand nature. The Health Unit reports that it is impossible to estimate the number of systems that are installed without their knowledge or approval.

With the increase in summer cottagers, formerly unpopulated lakes are being developed and rocky sites which were not in demand previously are being sold and built upon. Most of the cottages in these areas provide for water carried systems and septic tank installations. The public concern for the control of pollution has placed increased demands on the inspection staff resulting in the environmental health programme being mainly directed towards lot

inspections, new septic tank systems and pollution complaints, with other important activities receiving secondary action.

Section 4 (2) of Ontario Regulation 277/62, Sanitary Code for Unorganized Territory and Section 14, Schedule B of The Public Health Act, require that the approval in writing of the Medical Officer of Health be obtained before a private sewage disposal system is established. Apart from this there are no municipal by-laws to control the installation of septic tanks. The Health Unit requires that an application for approval of a sewage disposal system must be made by the owner or contractor. The onus is on the owner or contractor to obtain an application form for the establishment of a septic tank system. Forms may be obtained from the health unit offices, the Clerks of the municipalities and Building Inspectors. The Clerks and Building Inspectors distribute the Ontario Department of Health booklet "Septic Tank Systems" with the application form. This procedure is efficient only when municipal officials, owners and contractors co-operate and accept their responsibility.

The health unit advises that it is often necessary to compromise in the recommended standards contained in the booklet "Septic Tank Systems" for cottage installations in respect to size of the septic tank, absence of soil depth and inadequate size or shape of the lot.

Baxter and Gibson townships until August 1967 were not covered under subdivision control legislation. At that time, however, the Department of Municipal Affairs under the authority of The Planning Act issued an Order that all lands in the above two townships be

designated as an area of subdivision control under Clause (B) of Subsection 1 of Section 27 of the Act. All or part of 14 municipalities within the health unit have this legislation in effect for subdivision control.

Health unit officials state they found little evidence of gross pollution caused by cottage septic tank systems. On the other hand systems installed prior to the health unit formation and those installed without their knowledge do not always meet the basic public health requirements. Complaints regarding private sewage disposal installations are investigated as soon as possible.

The health unit advises the public during the summer months, by means of the local press in the four health unit centres, of their requirements concerning private sewage disposal systems. The Department of Health booklet "Septic Tank Systems" and local specifications are mailed to known applicants for building permits.

SANITARY SURVEY RESULTS - SIX MILE LAKE

Page 58 provides a statistical summary of the data collected on Six Mile Lake concerning the evaluation of:

(a) Private sewage disposal systems (165 systems observed)

(b) Kitchen waste disposal systems (148 systems observed)

(c) Laundry waste disposal systems (33 systems observed)

(d) Private refuse disposal practices (284 practices observed).

One hundred and sixty-four premises, including 2 commercial establishments, were inspected along 17 miles of shoreline of Six Mile Lake. However, again it should be pointed out that this figure need

have no positive bearing on the number of systems observed. For example, a single cottage may have a privy as well as a septic tank and if the cottage is used only on weekends, there may be no provision for laundry.

The graph on page 58 indicates that 10.3% of all private sewage disposal systems, 6.1% of all laundry waste disposal systems, 1.8% of the total refuse disposal practices and 11.5% of all kitchen waste disposal systems were contributing to pollution.

The table on page 71 indicates the type of sewage disposal systems encountered and the number and percentage of each type contributing to water pollution or causing a public health nuisance.

The graph on page 72 provides a further breakdown of the private sewage disposal systems contributing to pollution or causing public health nuisance.

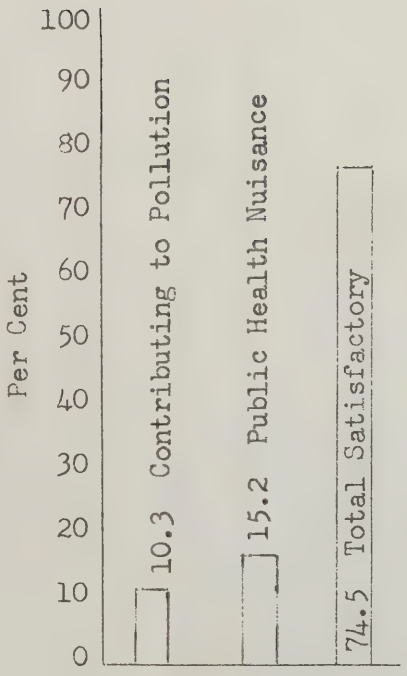
A map of Six Mile Lake indicating the area of the lake studied is found on page 73.

The statistics relating to the collection of lake water samples, both bacteriological and chemical, will be included later in this report.

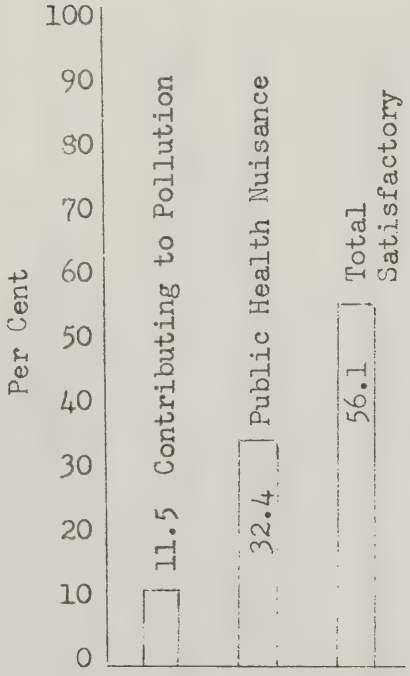
The details of the systems causing pollution or public health nuisance are shown on pages 59 to 70.

SIX MILE LAKE

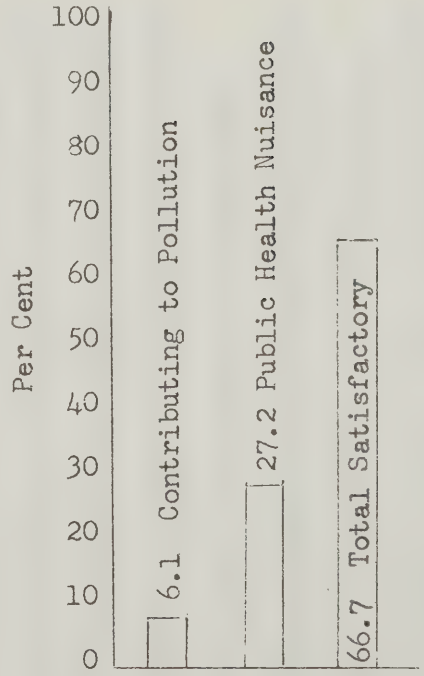
(An Evaluation of Waste Producing Systems)



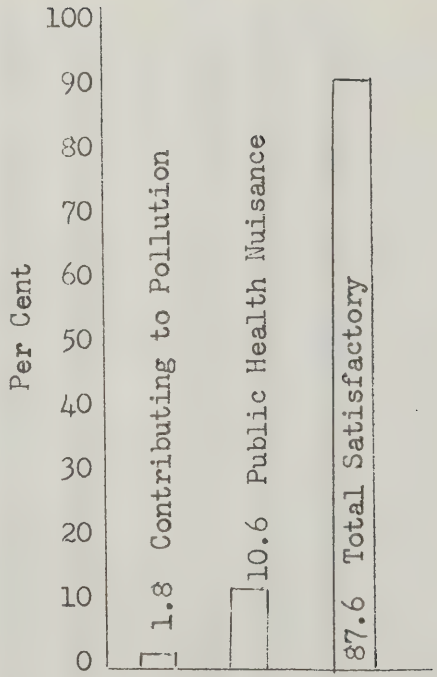
Private Sewage
Disposal Systems
(Total Systems = 165)



Kitchen Waste
Disposal Systems
(Total Systems = 148)



Laundry Waste
Disposal Systems
(Total Systems = 33)



Private Refuse
Disposal Practices
(Total Practices = 284)

SIX MILE LAKE

Toilet Waste

Sampling Location	System	Distance from Lake in Feet	Soil Depth Less than 5 Feet	Remarks	Pollution (P) or P.H. Nuisance (N)
2	Pit Privy	100	X		N
10	Pit Privy	65	X		N
12	Pit Privy	100			N
13	Mod. Flush	81	X	Insufficient soil cover	P
15	Mod. Flush	65	X	Poor design	P
16	Mod. Flush	66	X	Insufficient soil cover	P
17	Mod. Flush	25	X	Toilet tile almost on water table, Distance only 15 feet	P
18	Flush	36	X	Toilet waste draining to lake	P
23	Pit Privy	200			N
24	Pit Privy	150	X	Pit privy on rock	P
29	Mod. Flush	20	X	Disposal field very close to lake	P
33	Pit Privy	160	X		N
39	Mod. Flush	5	X	Toilet waste 2' above water table	P
46	Mod. Flush	33			N

Sampling Location	System	Distance From Lake in Feet	Soil Depth Less than 5 Feet	Remarks	Pollution (P) or P.H. Nuisance (N)
48	Mod. Flush	60	X	Draining to lake	P
49	Mod. Flush	150	X	Waste empties into marsh, No weeping tile	P
53	Mod. Flush	40			N
56	Pit Privy	70			N
59	Pit Privy	250			N
65	Mod. Flush	25	X		N
69	Flush	150	X		N
70	Pit Privy	120	X		N
72	Pit Privy	130			N
74	Pit Privy	110			N
80	Pit Privy	35	X		N
81	Pit Privy	100	X		N
98	Mod. Flush	60	X		N
100	Pit Privy	200			N
109	Pit Privy	120	X		N
111	Mod. Flush	20	X	Tile field 20' from lake	P

Sampling Location	System	Distance from Lake in Feet	Soil Depth Less than 5 Feet	Remarks	Pollution (P) or P.H. Nuisance (N)
117	Mod. Flush	50	X		N
125	Flush	25	X	Leaching Pit 25' from lake	P
126	Pit Privy	60			N
131	Pit Privy	120	X		N
137	Mod. Flush	50	X		N
141	Mod. Flush	85		Draining to lake	P
142	Pit Privy	120		Close to a stream	P
145	Pit Privy	115		Close to a stream and draining to lake	P
146	Mod. Flush	25	X	Poor design, Disposal area 25' from lake	P
151	Pit Privy	110			N
152	Container	125			N
160	Flush	100	X	Poor Construction	P

SIX MILE LAKE

Kitchen Waste

Sampling Location	System	Distance from Lake in Feet	Soil Depth Less than 5 feet	Remarks	Pollution (P) or P.H. Nuisance (N)
McG.	Surface	150			N
1	Surface	160			N
2	Surface	70			N
3	Leaching Pit	60	X	Insufficient soil cover, Close to lake	P
7	Leaching Pit	60		Insufficient soil cover, Close to lake	P
10	Surface	40	X	Draining to lake	P
12	Surface	100			N
13	Surface	75	X		N
15	Surface	36	X	Insufficient soil cover, Close to lake	P
16	Surface	33	X		N
21	Surface	15	X	Draining to lake	P
22	Leaching Pit	45			N
23	Surface	200			N
24	Leaching Pit	60	X	Insufficient soil cover	P

Sampling Location	System	Distance from Lake in Feet	Soil Depth Less than 5 feet	Remarks	Pollution (P) or P.H. Nuisance (N)
26	Surface	150			N
28B	Surface	100			N
43	Surface	50			N
48	Surface	60	X		N
49	Surface	50			N
52	Surface	70			N
53	Surface	30			N
55	Surface	100	X		N
57	Surface	100			N
58	Leaching Pit	45	X		N
59	Surface	250			N
64	Surface	100			N
65	Surface	20	X		N
66	Surface	25	X		N
67	Surface				N

Sampling Location	System	Distance from Lake in Feet	Soil Depth Less than 5 Feet	Remarks	Pollution (P) or P.H. Nuisance (N)
69	Surface	150			N
71	Leaching Pit	180			N
72	Surface	150			N
73	Surface	70			N
74	Surface	50			N
76	Leaching Pit	150			N
78	Surface	20	X		N
81	Surface				N
85	Surface	20	X	Insufficient soil cover, Close to lake	P
86	Surface	40	X		N
89	Surface	30			N
95	Surface	25			N
96	Leaching Pit	130	X		N
97	Leaching Pit	100	X		N
98	Surface				N

Sampling Location	System	Distance from Lake in Feet	Soil Depth Less than 5 Feet	Remarks	Pollution (P) or P.H. Nuisance (N)
99	Surface				N
100	Surface	40	X	Insufficient soil cover, Close to lake	P
105	Surface				N
106	Surface	40			N
109	Leaching Pit	40	X	Insufficient soil cover	P
111	Leaching Pit	30	X	Insufficient soil cover, Close to lake	P
112	Surface	40	X		N
114	Surface	130	X		N
116	Surface	50			N
123	Leaching Pit	25	X	Insufficient soil cover, Close to lake	P
125	Leaching Pit	15	X	Insufficient soil cover, Close to lake	P
126	Surface	35			N
127	Surface	50	X		N
131	Surface	90			N
137	Surface	4		Insufficient soil cover, Close to lake	P

Sampling Location	System	Distance from Lake in Feet	Soil Depth Less than 5 Feet	Remarks	Pollution (P) or P.H. Nuisance
140	Leaching Pit	35	X	Poor design, Close to lake	P
146	Leaching Pit	35	X	Insufficient soil cover, Close to lake	P
156	Surface	25	X		N
159	Surface	60			N
160	Surface	75	X	Poor design	P
170	Surface	65	X		N

SIX MILE LAKE

Laundry Waste

Sampling Location	Method	D I S P O S A L				Remarks	Pollution (P) or P.H. Nuisance (N)
		Septic Tank	Leaching Pit	Surface	Lake		
1	Machine	-	-	X	-		N
5	Machine	-	-	X	-		N
10	Machine	-	-	X	-		N
16	Manual	X	-	-	-		N
49	Machine	-	-	X	-		N
52	Machine	-	-	X	-		N
69	Machine	-	-	X	-		N
72	Manual	-	-	-	X	Draining into lake	P
76	Machine	-	-	X	-	Washing in the lake	P
100	Machine	-	-	X	-		N
122	Machine	-	-	X	-		N

SIX MILE LAKE

Solid Waste

Sampling Location	D I S P O S A L						Remarks	Pollution (P) or P.H. Nuisance (N)
	Burned	Buried	Local Dump	Home	Deposited in Bush	Lake		
4	X	-	X	-	-	-	Incineration on edge of lake	P
10	-	-	-	-	X	-	Drains to lake	P
11	X	-	-	-	X	-		N
12	X	-	-	-	X	-		N
13	X	-	-	-	X	-		N
18	X	-	-	-	X	-		N
19	X	-	X	-	X	-		N
20	X	-	-	-	X	-		N
22	X	-	-	-	X	-		N
23	-	-	-	-	X	-		N
24	X	-	-	-	X	-		N
26	X	X	-	-	X	-		N
29	-	-	-	-	X	-		N

Sampling Location	D I S P O S A L						Remarks	Pollution (P) or P.H. Nuisance (N)
	Burned	Buried	Local Dump	Home	Deposited in Bush	Lake		
31	X	-	-	-	X	-		N
42	-	X	-	-	X	-		N
50	X	-	-	-	X	-		N
52	X	-	-	-	X	-		N
55	X	-	X	-	-	-		N
59	-	-	-	-	X	-		N
66	X	-	-	X	X	-	Incomplete incineration on lakeshore	P
74	-	-	-	-	X	-	Swamp into lake	P
87	X	-	-	X	X	-		N
90	-	-	-	-	X	-	Swamp into lake	P
93	X	X	-	-	X	-		N
98	X	-	-	-	X	-		N
99	X	-	-	-	X	-		N
111	-	-	-	X	X	-		N

Sampling Location	D I S P O S A L						Remarks	Pollution (P) or P.H. Nuisance (N)
	Burned	Buried	Local Dump	Home	Deposited in Bush	Lake		
127	X	-	-	X	-	-		N
134	X	-	-	-	X	-		N
135	-	-	-	-	X	-		N
140	-	-	-	-	X	-		N
152	X	-	-	-	X	-		N
153	X	-	-	-	X	-		N
173	X	-	-	-	X	-		N
174	X	-	-	-	X	-		N

SIX MILE LAKE

Break Down of Private Sewage Disposal Systems

Type of System	Number	% of Total Systems	No. Contributing to Pollution	% of Type	No. of Public Health Nuisances	% of Type	Total Number	Unsatisfactory %
Septic Tank	86	52.1	14	16.3	7	8.1	21	24.4
Privy	66	40.0	3	4.5	17	25.8	20	30.3
Chemical	3	1.8	0	0	0	0	0	0
Other	10	6.1	0	0	1	10.0	1	10.0
Total	165	100.0%	17	N/A	25	N/A	42	N/A

Percentage of Total Systems Contributing to Pollution $\frac{17}{165} = 10.3\%$

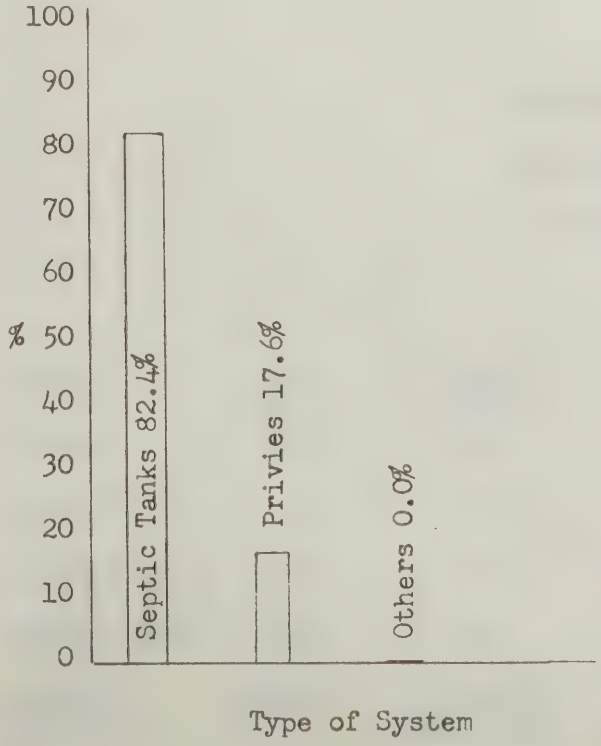
Percentage of Total Systems Causing a Public Health Nuisance $\frac{25}{165} = 15.2\%$

Percentage of Total Systems Unsatisfactory $\frac{42}{165} = 25.5\%$

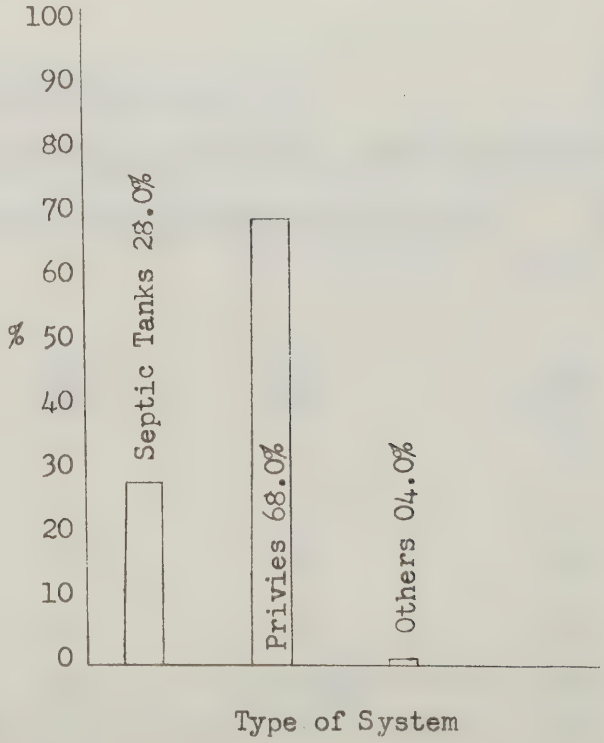
SIX MILE LAKE

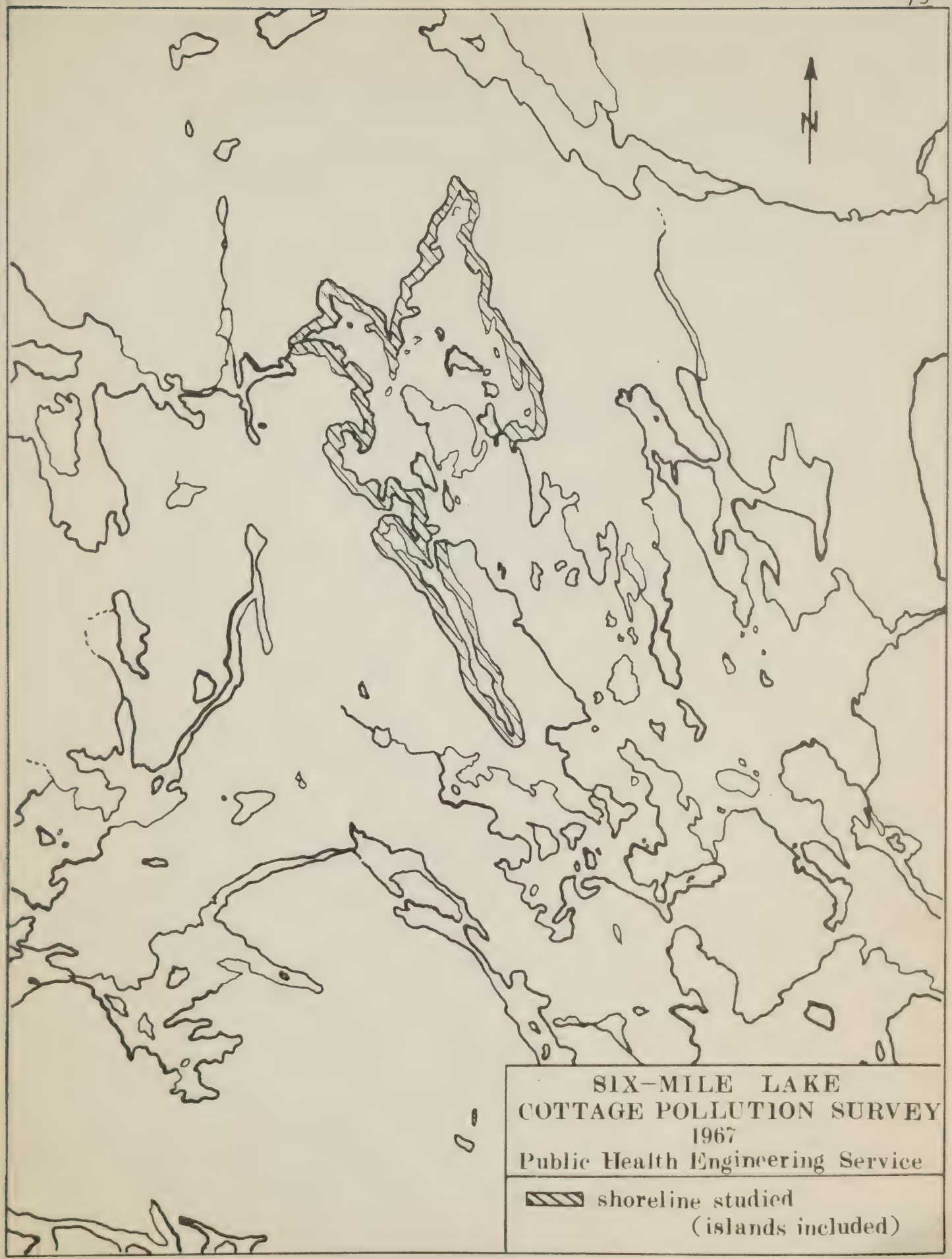
Breakdown of Private Sewage Disposal Systems

Percentage by which the Different Types of Systems Contributed to Pollution
(17 systems Contributing to Pollution = 100%)



Percentage by which the Different Types of Systems Caused Public Health Nuisances
(25 systems Causing Public Health Nuisances = 100%)

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SIX–MILE LAKE
COTTAGE POLLUTION SURVEY
1967
Public Health Engineering Service
shoreline studied
(islands included)

PART V - COMPARISON OF THE LAKES

In this part, the intention is to review the lakes collectively for the purpose of comparison and summary and to determine any similarities or trends that may be occurring. It is, however, obvious that due to the small sample of only three lakes any suggestions of predictability for recreational areas in general would be statistically invalid.

The three lakes are summarized under the following headings:

1. Waste producing systems
2. Criteria for rating a system as unsatisfactory
3. Bacteriological water reports on lake water samples
4. Chemical and biochemical water reports on lake water samples
5. Health Unit activity

Waste Producing Systems

Waste producing systems in this survey include:

Type	Total Systems Inspected	Total Classified As Public Health Nuisance	Total Contributing to Pollution
Private Sewage Disposal Systems	573	66	53
Kitchen Waste Disposal Systems	480	112	30
Laundry Waste Disposal Systems	132	62	9
Private Refuse Disposal Practices	700	34	10

Systems are not counted for kitchen and laundry wastes when their wastes are directed through a common system which is combined with the domestic sewage disposal system.

In the category "Public Health Nuisance" a review of the statistics contained in parts II, III and IV indicates a fairly wide fluctuation in the frequency with which increments were made to this category when evaluating the different types of systems.

The category "Contributing to Water Pollution" is of singular importance in this study and therefore a comparative evaluation of this category is outlined in graph form with percentage figures on page 76. Reference to this graph indicates that in the case of private sewage disposal systems, 9.2% of the total systems were contributing to pollution in a range between 7.2% at Jack Lake and 11.0% at Steenburg Lake.

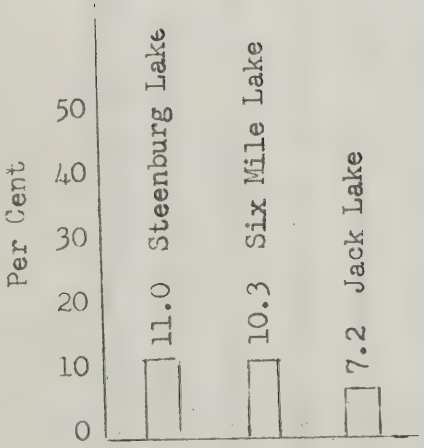
A fair degree of uniformity is also apparent in the comparison of (a) refuse disposal and (b) laundry waste disposal systems found to be contributing to pollution.

The same graph shows that in the case of private refuse disposal, Six Mile and Jack Lake deviate by only 5/10 of 1%. As explained earlier (The Study of Steenburg Lake) Steenburg Lake was in the unique position of having municipal dump sites conveniently available to 96% of the lake population which tends to explain the reason that no systems at this lake were contributing to pollution.

The widest variance between lakes was found in the number of kitchen waste disposal systems indicated as contributing to pollution. The range is from 1.5% contributing to pollution on Jack Lake to 11.5% at Six Mile Lake. One possible cause for this may be that Jack Lake utilized more subsurface disposal methods than the other two lakes.

PERCENTAGE OF SYSTEMS CONTRIBUTING TO POLLUTION

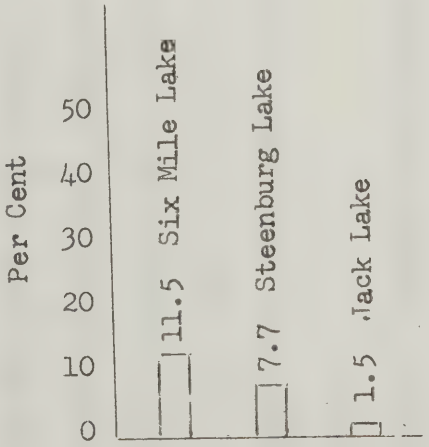
(A Summary and Comparison)



Private Sewage Disposal Systems Contributing to Pollution

Total Systems = 573

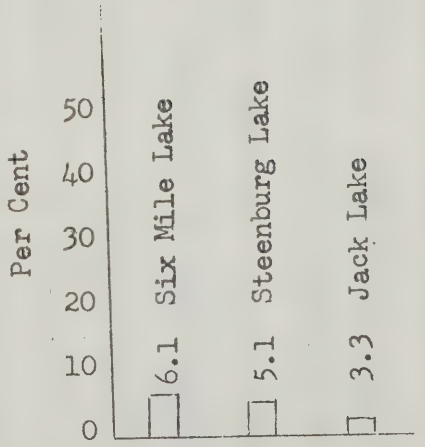
Contributing to Pollution = 53 (9.2%)



Kitchen Waste Disposal Systems Contributing to Pollution

Total Systems = 480

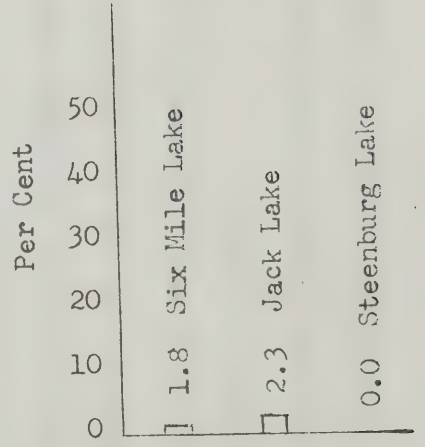
Contributing to Pollution = 30 (6.3%)



Laundry Waste Disposal Systems Contributing to Pollution

Total Systems = 132

Contributing to Pollution = 9 (6.8%)



Private Refuse Disposal Practices Contributing to Pollution

Total Practices = 700

Contributing to Pollution = 10 (1.4%)

In summary, it appears that, excluding kitchen waste disposal systems, general uniformity exists within the three lakes in the percentage of systems found contributing to water pollution. It is emphasized that the category "Contributing to Water Pollution" refers to systems that could be proven to be contributing material to the lake water, however, the quantity and quality of this pollution could not be accurately measured.

CRITERIA FOR RATING A SYSTEM AS UNSATISFACTORY

The graph on page 80 illustrates the parameters used and their frequency of appearance in evaluating systems as unsatisfactory. The 4 parameters involved are discussed below.

Proximity to Water Table - waste disposal systems located in or so close to the water table that pollution must be assumed.

Proximity to Lake - waste disposal systems located so near to the lake that pollution resulted.

Insufficient Soil Cover - waste disposal systems installed in areas unsatisfactory due to the lack of a reasonable depth of suitable soil cover over bedrock or hardpan for the installation of sub-surface waste disposal systems.

Faulty Design - Systems so constructed or in such a state of repair that their function was unsatisfactory. Insufficient size and the failure to provide a satisfactory system were also included in this category.

For the purpose of this study, failure to adhere to established recommendations and good practice were not considered as prime evidence for an unsatisfactory rating (e.g. the booklet "Septic Tank Systems" published by the Ontario Department of Health states that a septic tank system should be no closer than 50 feet to any lake, stream or pond. In this study a septic tank may have been located 35 feet from the lake yet due to other factors such as soil, quality, depth of soil, topography and the amount of effluent produced, this system could be judged as satisfactory). In some cases a system would be judged unsatisfactory for more than one reason.

The graph on page 80 indicates clearly that in many cases the causes for the unsatisfactory ratings were variable for an individual lake and again when the three lakes were considered collectively.

On Steenburg Lake and Six Mile Lake "faulty design" and "insufficient soil cover" received almost identical weight as the causes for unsatisfactory sewage disposal systems. "Faulty design" was again the prime reason for condemning kitchen waste disposal systems on these lakes.

In general it would appear that failure to (a) properly design and construct suitable waste disposal systems and (b) the lack of a reasonable depth of suitable soil cover are the primary reasons that systems were considered unsatisfactory although other

factors are also involved to varying degrees and cannot be overlooked. Indications were that the provision of technical assistance and proper supervision prior to installation could have averted many of these problems.

CRITERIA FOR RATING SYSTEMS AS UNSATISFACTORY

(Expressed in Percentages)

Private Sewage Disposal

Kitchen Waste Disposal

Frequency of Causes (%)

0 10 20 30 40 50 60 70 80 90 100

JACK LAKE

Proximity to Water Table: 14.52, 13.51

Insufficient Soil Cover: 16.13, 13.51

Faulty Design: 51.61, 62.16

Proximity to Lake: 17.74, 10.82

STEENBURG LAKE

Proximity to Water Table: 5.74, 3.18

Insufficient Soil Cover: 28.56, 6.35

Faulty Design: 28.56, 77.80

Proximity to Lake: 37.14, 12.69

SIX MILE LAKE

Proximity to Water Table: 7.69, 1.00

Insufficient Soil Cover: 34.61, 11.11

Faulty Design: 34.60, 62.64

Proximity to Lake: 23.10, 25.25

LABORATORY REPORTS - LAKE WATER

(a) Bacteriological Water Samples

As stated in the introduction to this report, field crew members collected water samples for bacteriological examination from the lake at the immediate front of all premises. In this way observations concerning the function of individual waste disposal practices could be further evaluated on a lot by lot basis. The Jack and Steenburg Lake crews submitted the samples to the Regional Laboratory at Peterborough while the Six Mile Lake crew utilized the Regional Laboratory in Orillia. Water samples were collected daily and submitted twice weekly under refrigeration.

In total 1758 samples were collected for bacteriological examination and the reports received from these samples were placed in one of the four following categories.

1. 0 Total Coliform Organisms - 0 Faecal Coliform Organisms /100 ml.
2. Less than 2400 Total Coliform Org. - 0 Faecal Coliform Org. /100 ml.
3. Greater than 2400 Total Coliform Org. - 0 Faecal Coliform Org. /100 ml.
4. Positive for Total Coliform Org. - Positive for Faecal Coliform Org.

Total coliform organisms are composed of organisms that normally live in soil, various types of vegetation, or faecal discharge but smaller in numbers than the faecal coliforms.

In general terms, the presence of total coliform organisms in water usually suggests pollution with soil run-off water or water polluted with sewage sometime in the past. Faecal coliforms in water indicate a recent or possibly dangerous faecal (human or animal) contamination.

Some organisms of the total coliform group will survive longer in water than faecal coliform organisms, thus a past history of sewage pollution, or sewage pollution from a distant source, could cause a laboratory report to show the absence of faecal coliforms with the presence of total coliforms.

The graph on page 83 indicates the number of samples collected at each lake which fall under the above four categories.

The table on page 84 indicates the number of samples collected at each lake and the percentage of those samples falling in each of the four categories.

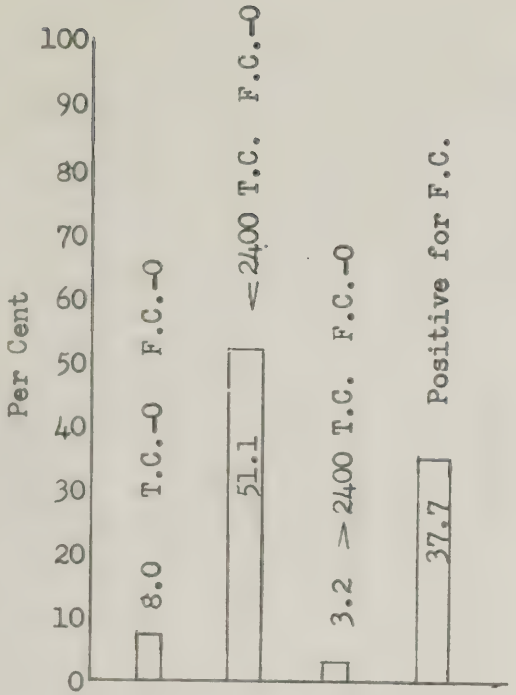
The following graph on page 85 compares the sample results by category for each lake. It is apparent from the graphs that the shoreline water in all three lakes is markedly similar in bacteriological quality.

It is emphasized, however, that the majority of bacteriological water samples were collected as closely to the shoreline as possible in an attempt to correlate bacteriological results with the physical conditions.

The presence of total and faecal coliform organisms as an independent criteria could not be considered as an indication of pollution from a given premises for well known reasons such as lake currents, flow of water and the contributions of animals and birds.

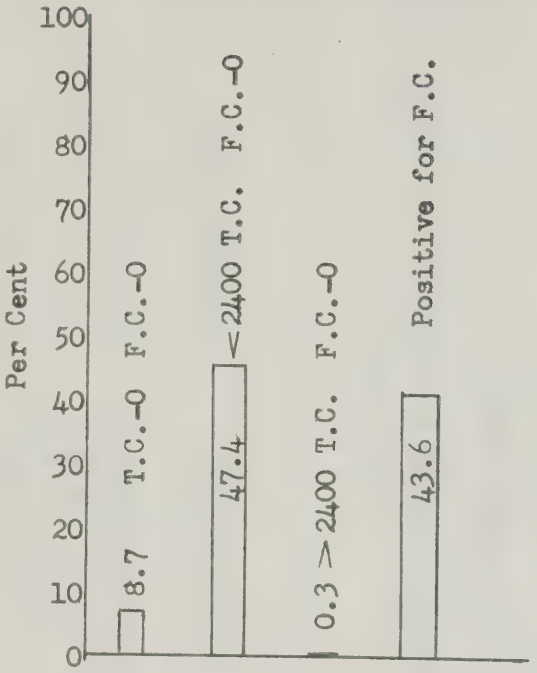
Where there was evidence of liquid waste or sewage ponding on a lot, bacteriological samples were also collected in order to determine the nature of the ponding material. These samples are distinct from the above discussion and are not included in the graphical analysis.

BACTERIOLOGICAL WATER REPORTS FROM LAKE WATER



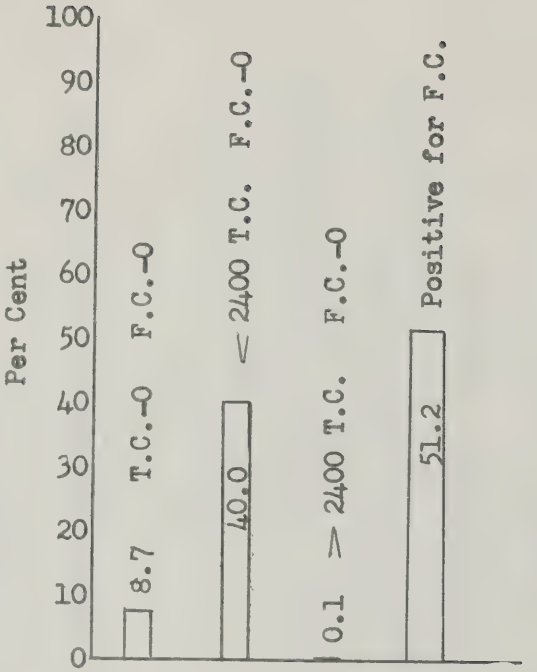
Six Mile Lake

475 Total Samples



Jack Lake

650 Total Samples



Steenburg Lake

633 Total Samples

Bacteriological water samples were collected as closely as possible to the shoreline in an attempt to indicate the incidence of pollution. These results are not intended to evaluate the bacteriological quality of lake water for recreational purposes.

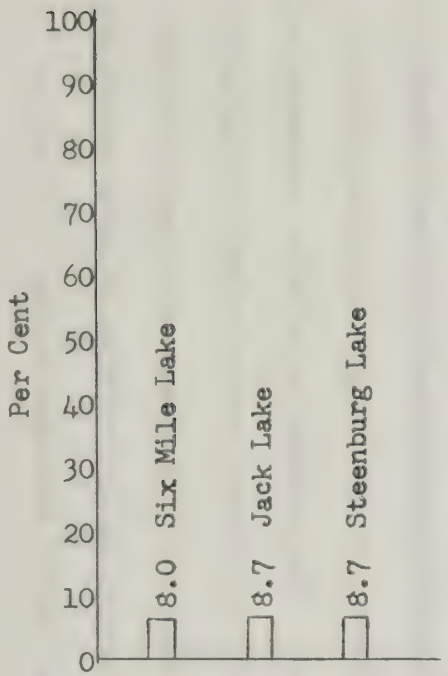
BACTERIOLOGICAL WATER REPORTS FROM LAKE WATER

Number of Samples in Categories
(M.P.N. Per 100 ml.)

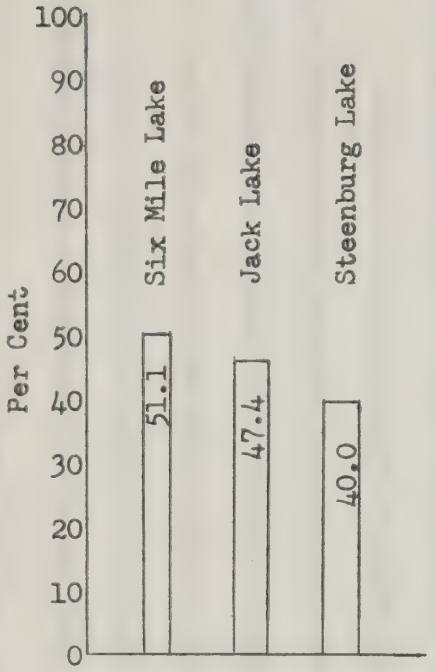
Lake	Total Coliforms - 0 Faecal Coliforms - 0	Total Coliforms -=<2400 Faecal Coliforms - 0	Total Coliforms -=>2400 Faecal Coliforms - 0	Positive for Faecal Coliforms
Six Mile Lake	37	237	21	180
Jack Lake	57	308	2	283
Steenburg Lake	55	250	4	324

BACTERIOLOGICAL WATER REPORTS FROM LAKE WATER

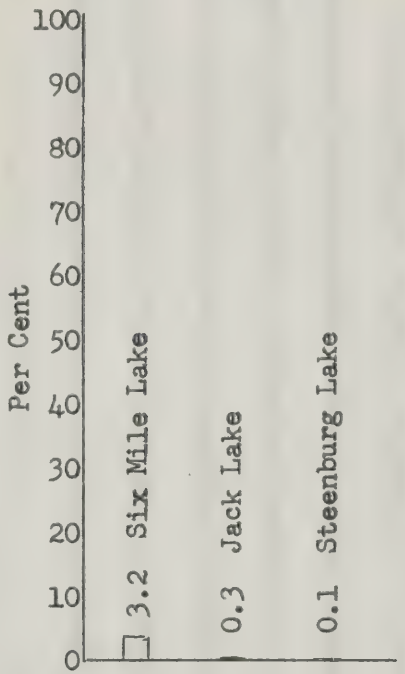
(A Summary and Comparison)



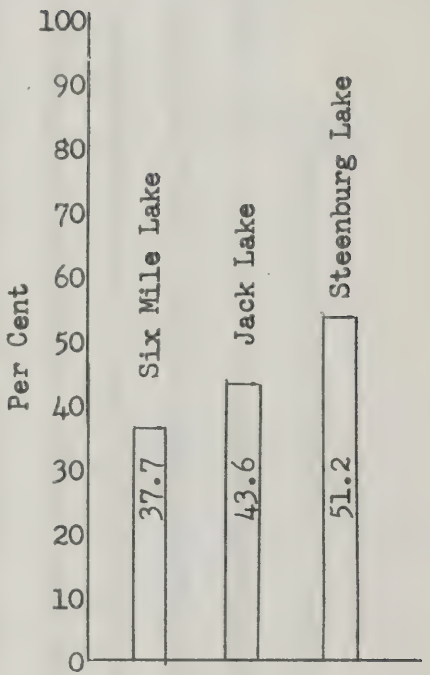
T.C.-0 F.C.-0/100 ml.



< 2400 T.C F.C.-0/100 ml.



> 2400 T.C. F.C.-0/100 ml.



Positive for F.C.

Bacteriological water samples were collected as closely as possible to the shoreline in an attempt to indicate the incidence of pollution. These results are not intended to evaluate the bacteriological quality of lake water for recreational purposes.

(b) Chemical and Biochemical Water Samples

Water samples for chemical analyses were collected along the shoreline in different areas or in front of those lots where pollution was indicated and also from the interior of the lakes to serve as a control. The three categories have been named as L, A and C respectively. A total of 64 samples, always preserved with ice, had been shipped promptly to the Central Public Health Laboratory in Toronto for analyses. The laboratory results for biological oxygen demand, suspended solids, ammonia nitrogen, organic nitrogen and soluble phosphate are tabulated on pages 89 to 94. In the cases where suspended solids had high values, volatile suspended solids were also determined.

Biological oxygen demand (B.O.D.) is a test for determining the quantity of oxygen that would be required for the complete stabilization of a polluted water through biochemical decomposition of organic matter under aerobic conditions. It is an index showing the polluting power or strength of sewage, industrial waste or of a polluted water. In Ontario the objective of the Ontario Water Resources Commission for discharge of effluent into a water stream is 4 p.p.m. of B.O.D.

Suspended solids are the foating and relatively slow to settle particles in an effluent or water and the test may indicate that pollution is occurring. The quantity of volatile suspended solids is a measure of the quantity or organic matter present in the solids and an indication of the adequacy of the sewage treatment provided. Presence of these solids results in difficulties in water purification processes. O.W.R.C. objective for suspended solids is 15 p.p.m.

Free ammonia and organic nitrogen taken together is an index of the organic nitrogenous matter present in an effluent or water; ammonia being the initial soluble product in the decomposition process. The concentration of ammonia in water in excess of 0.1 mgm. per litre might render the water suspect of recent pollution. The normal range for total nitrogen in water is considered to be 0.1 to 0.5 mgm. per litre.

Phosphates in surface waters are seldom found in a significant concentration. A high concentration could be due to the use of detergents, leaching from cesspools or from excessive application of fertilizers. Phosphorous is an essential nutrient for algae and weed growth. A concentration of more than 0.2 mgm. per litre of phosphorous in surface water might be considered as an indication that some phosphorous of sewage origin could be present.

In the present study the values of the chemical constituents as determined from the shoreline samples were in general, similar to those of control samples taken from the interior of the lake. In a few samples, however, where the sewage could be seen flowing into the lake and the coliform index had indicated a high count, the effect of pollution was reflected in the chemical analyses. The samples showing relatively higher values than the rest but still well within the accepted limits of water quality criteria are tabulated on page 88.

SAMPLES SHOWING POLLUTION

Sampling Location	*B.O.D.	*Suspended Solids	*Volatile Suspended Solids	*Nitrogen (N) Ammonia	*Nitrogen (N) Organic	*Soluble Phosphate PO_4	**Total Coliforms	**Faecal Coliforms	Remarks
Steenburg Lake									
L54B	1.0	36.3	18.7	.072	0.16	0.2	2,400	2,300	
L55B	8.0	7.8	-	.768	0.30	0.6	240,000	240,000	
L60	3.5	27.7	12.7	.018	0.26	0.2	23	23	
L71	4.0	1.5	-	.042	.168	0.1	240	240	
Jack Lake									
L2	0.6	1.2	-	.042	.264	0.2	15	15	
L32	0.5	19.7	15.4	.18	0.27	0.2	240,000	2,400	
L38	3.5	113	68	.02	0.42	0.1	240,000	240,000	
Six Mile Lake									
L19	0.5	12.7	-	.018	0.144	0.2	150	0	

*Parts per million (p.p.m.)

** M.P.N. per 100 ml.

JACK LAKE

*Chemical Analysis

Samples	B.O.D.	Suspended Solids	Volatile Suspended Solids	Nitrogen (N) Ammonia	Nitrogen (N) Organic	PO_4	Remarks
Control 4	0.7	0.8		0.042	0.138	<0.1	West end of Brooks Bay
L2	0.6	1.2		0.048	0.138	0.2	
L21B	0.75	1.9		0.042	0.264	<0.1	
L22D	0.8	Traces		0.024	0.132	<0.1	
Control 1	0.4	Traces		0.015	0.138	<0.1	Mid Brooks Bay
L24	0.9	1.2		0.012	0.102	0.1	
L27	0.35	2.3		0.060	0.210	<0.1	
L28	0.7	0.6		0.036	0.138	0.1	
Control 2	0.8	1.1		0.072	0.132	<0.1	Mouth Brooks Bay
L32	0.5	19.7	15.4	0.180	0.270	0.2	

* Parts per million (p.p.m.)

Samples	B.O.D.	Suspended Solids	Volatile Suspended Solids	Nitrogen (N) Ammonia	Nitrogen (N) Organic	PO_4	Remarks
L38	3.5	113	68	0.024	0.42	0.1	Swamp
	-	11,420	2,950	300	72	104	
L47	0.8	0.7		0.024	0.084	0.2	
L55	0.8	1.2		0.012	0.102	0.3	
Control 3	1.1	2.8		0.120	0.210	0.1	Halle's Creek
L74	0.5	1.0		0.012	0.108	≤ 0.1	
L145	0.8	3.4		0.018	0.252	≤ 0.1	
	High	4,000	2,400	18.8	39	24	

SIX MILE LAKE

* Chemical Analysis

Samples	B.O.D.	Suspended Solids	Volatile Suspended Solids	Nitrogen (N) Ammonia	Nitrogen (N) Organic	PO_4	Remarks
L15	0.4	0.8		0.006	0.102	<0.1	In front of rock face
15	0.0	2.0		0.012	0.120	<0.1	Mouth of Bay
L17	0.0	0.8		0.006	0.102	<0.1	
L19	0.5	12.7		0.018	0.144	0.2	Bay where creek runs in weeds
L24	0.2	1.0		0.018	0.156	<0.1	At mouth of swamp
L45	0.4	1.5		0.018	0.144	<0.1	
45	0.4	2.2		0.036	0.120	<0.1	
L50	0.5	1.8		0.024	0.138	0.1	Weedy Bay

* Parts per million (p.p.m.)

STEENBURG LAKE

* Chemical Analysis

Samples	B.O.D.	Suspended Solids	Volatile Suspended Solids	Nitrogen (N) Ammonia	Nitrogen (N) Organic	PO_4	Remarks
Control A	0.7	1.6		0.030	0.156	<0.1	Upper West arm of lake For Location L2 to L25
	1.6	0.5		0.018	0.168	0.2	
	-	1.5		0.036	0.144	<0.1	
	1.6	2.3		0.078	0.114	3.8	
L2	0.5	1.6		0.012	0.120	0.1	
L6	1.4	1.0		0.024	0.138	<0.1	
L11	0.8	1.4		0.018	0.132	0.1	
L20	1.7	1.4		0.012	0.120	<0.1)	One location
	1.6	1.4		0.012	0.144	<0.1)	
Control B1	0.6	1.8		0.024	0.180	<0.1	Midpoint of North arm of lake
	0.8	1.2		0.030	0.102	<0.1	

* Parts per million (p.p.m.)

Samples	B.O.D.	Suspended Solids	Volatile Suspended Solids	Nitrogen (N) Ammonia	Nitrogen (N) Organic	PO_4	Remarks
Control B2	1.8	0.7		0.012	0.156	<0.1	Lower end of North arm of lake
	0.6	2.1		0.024	0.150	<0.1	
Area 7	0.6	1.7		0.018	0.132	<0.1	For location L27 to L37
L33B	0.7	2.0		0.072	0.156	<0.1	
L54B	1.0	36.3	18.7	0.072	0.160	<0.1	
L55	1.3	3.3		0.078	0.184	<0.1)	
	8.0	7.8		0.768	0.300	0.6)	One location
Area 10	1.0	2.2		0.054	0.150	0.1	For location L54 to L55
L60	3.5	27.7	12.7	0.018	0.264	0.2	
Area 11	0.6	2.2		0.006	0.120	0.1	For location L56 to L57
L71	4.0	1.5		0.042	0.168	<0.1	
L77	0.4	2.2		0.030	0.168	<0.1	

Samples	B.O.D.	Suspended Solids	Volatile Suspended Solids	Nitrogen (N) Ammonia	Nitrogen (N) Organic	PO_4	Remarks
Area 14 & 15	0.7	3.2		0.042	0.132	≤ 0.1	For location L81 to L83
	1.4	1.0		0.018	0.168	≤ 0.1	For location L84 to L94
Control C	0.9	1.4		0.012	0.102	0.2	Mid point of East arm of Lake
	0.9	1.2		0.024	0.168	≤ 0.1	
L119	0.65	2.4		0.096	0.138	≤ 0.1	
L125	0.90	1.5		0.024	0.180	≤ 0.1	One location
	0.80	3.8		0.048	0.360	≤ 0.1	
Control D	0.4	1.7		0.030	0.132	0.1	Lower west arm of Lake
	0.6	1.7		0.018	0.150	0.2	

Health Unit Activity in Land Development and Private Sewage Disposal Control

The following table indicates the year that each of the health units were formed and the resident population that they serve. It is stressed once again that population increases from 20% in one of the units to over 500% in another unit during the summer season.

Name of Health Unit	Year Health Unit Formed	Resident Population of Health Unit	Lake Studied
Peterborough County-City Health Unit	1965	78,800	Jack Lake
Hastings and Prince Edward Counties Health Unit	1966	107,500	Steenburg Lake
Muskoka and District Health Unit	1950	37,000	Six Mile Lake

Section 14, Schedule B of The Public Health Act is a statutory by-law in force in all organized municipalities until amended by the municipal council. This section states: "No privy-vault, cesspool, septic tank or reservoir into which a privy, water closet, stable or sink is drained shall be established until the approval in writing of the medical officer of health has been obtained."

In the unorganized territory, Schedule B of The Public Health Act is not applicable. However, in its place Section 4 (2), Ontario Regulation 277/62, Sanitary Code for Unorganized Territory, does apply to the establishment of private sewage disposal systems.

Only one municipality within the areas studied has provided a septic tank by-law although most organized municipalities have building by-laws which are enforced to varying degrees. Two of the health units feel that the present statutory legislation is adequate.

Some municipalities within the health units studied have enacted subdivision control by-laws under the authority of The Planning Act administered by the Department of Municipal Affairs. Such by-laws are intended to ensure adequate planning in new land developments. Under such by-laws the Community Planning Branch of the Department of Municipal Affairs requests health units to provide a report on the suitability of proposed subdivisions concerning the public health aspects of the site.

When crown land is offered for sale, the Ontario Department of Lands and Forests requests the Health Unit involved to carry out an inspection of the site. The Health Unit's report and recommendations are submitted to the Community Planning Branch.

Although the health units' objectives relating to the control of private sewage disposal systems are similar the procedures of this control are variable.

Each of the units studied requires that an application form be completed by the owner or contractor before the private sewage disposal system is established. Following a satisfactory inspection report, approval is issued and the particulars of the installation are recorded.

Application forms for private sewage disposal systems are always available at Health Unit offices and in most cases from the Municipal Clerk. In the Muskoka Health Unit municipal clerks and/or building inspectors distribute "application forms for inspection". Some municipalities request the public health inspectors to carry out lot inspections prior to issuing a building permit.

This type of programme is only effective when municipal officials, owners and contractors accept their responsibility and co-operate. Again, in order to achieve effectiveness, the public must be aware of the requirements of the health unit. In many cases difficulty has been experienced by the prospective owner who is unaware of the standards and restrictions for private sewage disposal systems. Use of the local press has been made by inserting notices advising the public of the health units' requirements in two of the units. None of the units studied presently use other methods such as posters placed at recreational areas to inform cottagers.

The provincial department's booklet "Septic Tank Systems" is distributed by the health units to individuals planning a septic tank system.

Prior to the formation of all health units and health departments, part-time medical officers of health were responsible for the enforcement of The Public Health Act and minimum control was exercised over private sewage disposal installations. Many of the problems encountered today regarding sewage disposal result from this former situation.

Although the three units spend a high percentage of the inspectors' time on recreational sanitation and in doing so sacrifice other important areas of environmental health, no unit considers its present programme of private sewage disposal control adequate. In order to achieve effectiveness in the programme many modifications in policy and an increase in staff would seem to be essential.

PART VI - CONCLUSIONS

1. Approximately 9.2% of the domestic sewage disposal systems inspected were found to be contributing pollution to the lake water ranging from 7.2% at Jack Lake to 11.0% at Steenburg Lake. In addition to this, many of the systems not contributing to pollution were considered to be public health nuisances.

(b) Kitchen waste disposal systems were found to be contributing to pollution within a range of 1.5% at Jack Lake to 11.5% at Six Mile Lake. Considering the three lakes collectively 6.3% of these systems were contributing to pollution. Those systems judged as public health nuisances varied from 10.9% at one lake to 32.4% at another.

(c) It was found that 4.5% of all laundry waste disposal systems were contributing material to the lake water in a range varying from 3.3% to 6.1%.

(d) The primary reasons that systems were judged to be unsatisfactory were because of "Faulty Design" and "Insufficient Suitable Soil Cover". Although the three lakes studied are geographically located within the Precambrian Shield which is characterized by shallow soil, rock and irregular terrain, it appears that with adequate technical knowledge and supervision satisfactory systems could have been installed in most cases.

2. Where local refuse disposal sites were conveniently available to cottagers private refuse or garbage disposal did not create a problem. At the two lakes without local municipal dumpsites

2.3% and 1.8% of the private refuse disposal practices employed were found to be contributing to pollution. At the other lake where dump sites were available no pollution from this source was observed at the cottage sites.

3. None of the health units concerned with this study considered that its programme of private sewage disposal control at recreational areas was adequate and all reported that in their opinion many new systems were being installed without their knowledge. In most cases, privies, laundry and kitchen waste disposal systems were not inspected.

4. Strict enforcement of municipal building by-laws and the provision of such by-laws in areas where they do not exist at present would be of benefit for providing better control in this situation. Local building by-laws could be amended to include automatic notification to the health unit when construction is considered by a new owner. This information would afford a course of action for the local health authorities.

5. It is assumed that new property owners may not be aware of the restrictions involved in private sewage disposal. It would appear that these restrictions together with the health units' services should be more fully advertised in order to ensure that all new owners are aware of the law in regard to private sewage disposal. Similar consideration should also be given to individual kitchen and laundry waste disposal systems.

6. Only a few of the townships within the health units studied had subdivision control by-laws in effect. Local subdivision control legislation should be of considerable value in controlling new land development.

7. It has been shown that the population at recreational areas is greatly increased during the summer months and at present a high degree of the inspectional time is spent on matters of recreational sanitation. In order to provide adequate control over all new sewage disposal installations and other recreational sanitation matters an increase in inspection staff either part-time or permanent appears to be essential.

8. Information, preferably in the form of a booklet, should be prepared and distributed to the local health units by the Department of Health concerning "alternate methods of sewage disposal" that would be more applicable than the present booklet "Septic Tank Systems" for use in the cottage areas.

9. The Cottage Pollution Survey (1967) was limited to the evaluation of only three lakes. It is indicated, as a result of the information obtained, that this programme should be continued during 1968 and possibly thereafter, in order that additional lakes in other geographical areas could be included and more complete data collected.

APPENDIX I

ONTARIO

DEPARTMENT OF HEALTH

NOTICE TO SUMMER COTTAGERS

The Ontario Department of Health has selected your lake as one of three lakes in a pilot study to be conducted during the summer months. This study is being made at the request of the Ontario Economic Council on behalf of its Tourist Industry Committee.

The purpose of the study is to establish the effectiveness of the methods used for cottage sewage, laundry and kitchen waste and refuse disposal. The quality of the lake water in immediate, individual cottage areas will be assessed by bacteriological and chemical examination.

Each cottage will be visited by two members of the Department's staff to interview the cottage occupants and complete a questionnaire. The data obtained will be kept in confidence and used for the purpose of the study only.

Your Medical Officer of Health has given his full support to this study.

Your co-operation will greatly assist the Department in the collection of the necessary information and contribute to the success of the survey.

COTTAGE SANITARY SURVEY

LAKE _____

PUBLIC HEALTH ENGINEERING SERVICES, ONTARIO DEPARTMENT OF HEALTH

LOCATION _____

HEALTH SURVEY AIDE _____ DATE _____ TIME _____ HEALTH UNIT CONSULTED ☐ HEALTH UNIT INSPECTED ☐

COTTAGE ☐
COMMERCIAL ☐
INDUSTRIAL ☐

SUMMER USE ☐ AGE <5 YEARS ☐
WINTER USE ☐

NO. OF ROOMS _____
NO. OF OCCUPANT DAYS _____

TREATING FOR WATERWEEDS ☐

OUTSIDE SPRAYING (INSECTS) ☐

DISPOSAL METHOD

TYPE OF TOILET	TOILET WASTE DISPOSAL	KITCHEN WASTE	LAUNDRY	REFUSE DISPOSAL
H ☐	SEPTIC TANK ☐	COMB. SYSTEM ☐	WASHING FACILITIES	BURNED ON LOT ☐
OD. FLUSH ☐	MATERIAL _____	LEACHING PIT ☐	TYPE _____	BURIED ON LOT ☐
A-DAY ☐	BURIED ☐	TO SURFACE ☐		TO LOCAL DUMP ☐
RIVY ☐	LEACHING PIT ☐		WASTE DISPOSAL	TO HOME ☐
MICAL ☐	TILE BED _____ FT.		METHOD _____	DEPOSITED IN BUSH ☐
				DEPOSITED IN LAKE ☐
				COLLECTION SERVICE ☐

DISPOSAL AREA

OGRAPHY SUITABLE ☐
ANCE FROM LAKE _____ FT.
DEPTH <5 FEET ☐
SURFACE WET ☐
NNING TO LAKE ☐

DISPOSAL AREA

DISTANCE FROM LAKE _____ FT.
SOIL DEPTH <5 FT. ☐
SURFACE WET ☐
DRAIN. TO LAKE ☐

POLLUTING LAKE ☐ | POLLUTING LAKE ☐ | POLLUTING LAKE ☐

LUTING LAKE ☐ P.H. NUISANCE ☐ | P.H. NUISANCE ☐ | P.H. NUISANCE ☐ | P.H. NUISANCE ☐

WATER SUPPLY

DRINKING	OTHER USE
RUNNING WATER SYSTEM ☐	RUNNING WATER SYSTEM ☐
SOURCE	SOURCE
LAKE ☐	LAKE ☐
COTTAGE WELL ☐	WELL ☐
SPRING ☐	CISTERN ☐
FROM HOME ☐	
LOCAL TOWN ☐	
CISTERN ☐	
TREATMENT AT COTTAGE	TREATMENT AT COTTAGE
FILTERED ☐	FILTERED ☐
DISINFECTED ☐	DISINFECTED ☐
NONE ☐	NONE ☐
STRUCTURE UNSAT. ☐	
LOCATION UNSAT. ☐	
TREATMENT UNSAT. ☐	

SKETCH

LABORATORY RESULTS

DESCRIPTION _____

CURRENT MOVEMENT _____FT/____ MIN

VOLUME OF WASTE WATER FLOW PER OCCUPANT PER DAY INTO LAKE

REFER TO SAMPLE NO. ____

WASTE WATER INTO LAKE

SAMPLE NO. ____

LAKE SAMPLE

SAMPLE NO. ____

DATE	TC/100 ml.	FC/100 ml.	BOD_5	NITROGEN		Phos-phate	Susp. Solids
				AMMONIA	ORGANIC	PO_4	S.S

COTTAGE SANITARY SURVEY

PUBLIC HEALTH ENGINEERING SERVICES, ONTARIO DEPARTMENT OF HEALTH

LAKE _____

LOCATION _____

HEALTH SURVEY AIDE J. DOE DATE JULY 9/67 TIME 3:45 HEALTH UNIT CONSULTED ☐ HEALTH UNIT INSPECTED ☐

COTTAGE ☒
COMMERCIAL ☐
INDUSTRIAL ☐

SUMMER USE ☒ AGE <5 YEARS ☐
WINTER USE ☐

NO. OF ROOMS 6
NO. OF OCCUPANT DAYS 152

TREATING FOR WATERWEEDS ☐

OUTSIDE SPRAYING (INSECTS) ☐

DISPOSAL METHOD

...OF TOILET	TOILET WASTE DISPOSAL	KITCHEN WASTE	LAUNDRY	REFUSE DISPOSAL
...H ☒	SEPTIC TANK ☒	COMB. SYSTEM ☐	WASHING FACILITIES TYPE NONE	BURIED ON LOT ☒
...D. FLUSH ☐	MATERIAL STEEL	LEACHING PIT ☐		BURIED ON LOT ☐
...-A-DAY ☐	BURIED ☒	TO SURFACE ☒	WASTE DISPOSAL METHOD N/A	TO LOCAL DUMP ☒
...RIVY ☐	LEACHING PIT ☐			TO HOME ☐
...ICAL ☐	TILE BED 30 FT.			DEPOSITED IN BUSH ☐
				DEPOSITED IN LAKE ☐
				COLLECTION SERVICE ☐

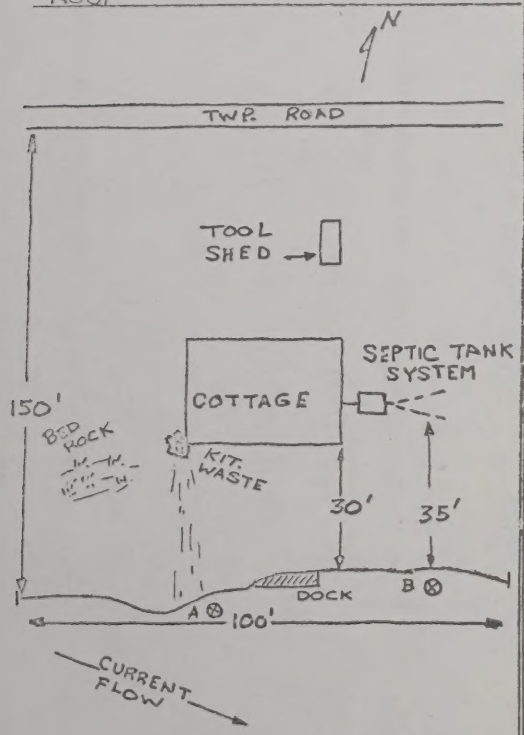
...DISPOSAL AREA	DISPOSAL AREA		
...OGRAPHY SUITABLE ☐	DISTANCE FROM LAKE 30 FT.		
...ANCE FROM LAKE 35 FT.	SOIL DEPTH <5 FT. ☒		
...DEPTH <5 FEET ☒	SURFACE WET ☒		
...URFACE WET ☒	DRAIN. TO LAKE ☒		
...TING TO LAKE ☒			
	POLLUTING LAKE ☒	POLLUTING LAKE ☐	POLLUTING LAKE ☐
...LUTING LAKE ☒ P.H. NUISANCE ☐	P.H. NUISANCE ☐	P.H. NUISANCE ☐	P.H. NUISANCE ☐

WATER SUPPLY

DRINKING	OTHER USE
RUNNING WATER SYSTEM ☐	RUNNING WATER SYSTEM ☒
SOURCE	SOURCE
LAKE ☐	LAKE ☒
COTTAGE WELL ☐	WELL ☐
SPRING ☐	CISTERN ☐
FROM HOME ☒	
LOCAL TOWN ☐	
CISTERN ☐	
TREATMENT AT COTTAGE	TREATMENT AT COTTAGE
FILTERED ☐	FILTERED ☐
DISINFECTED ☐	DISINFECTED ☐
NONE ☐	NONE ☒
STRUCTURE UNSAT. ☐	
LOCATION UNSAT. ☐	
TREATMENT UNSAT. ☐	

SKETCH

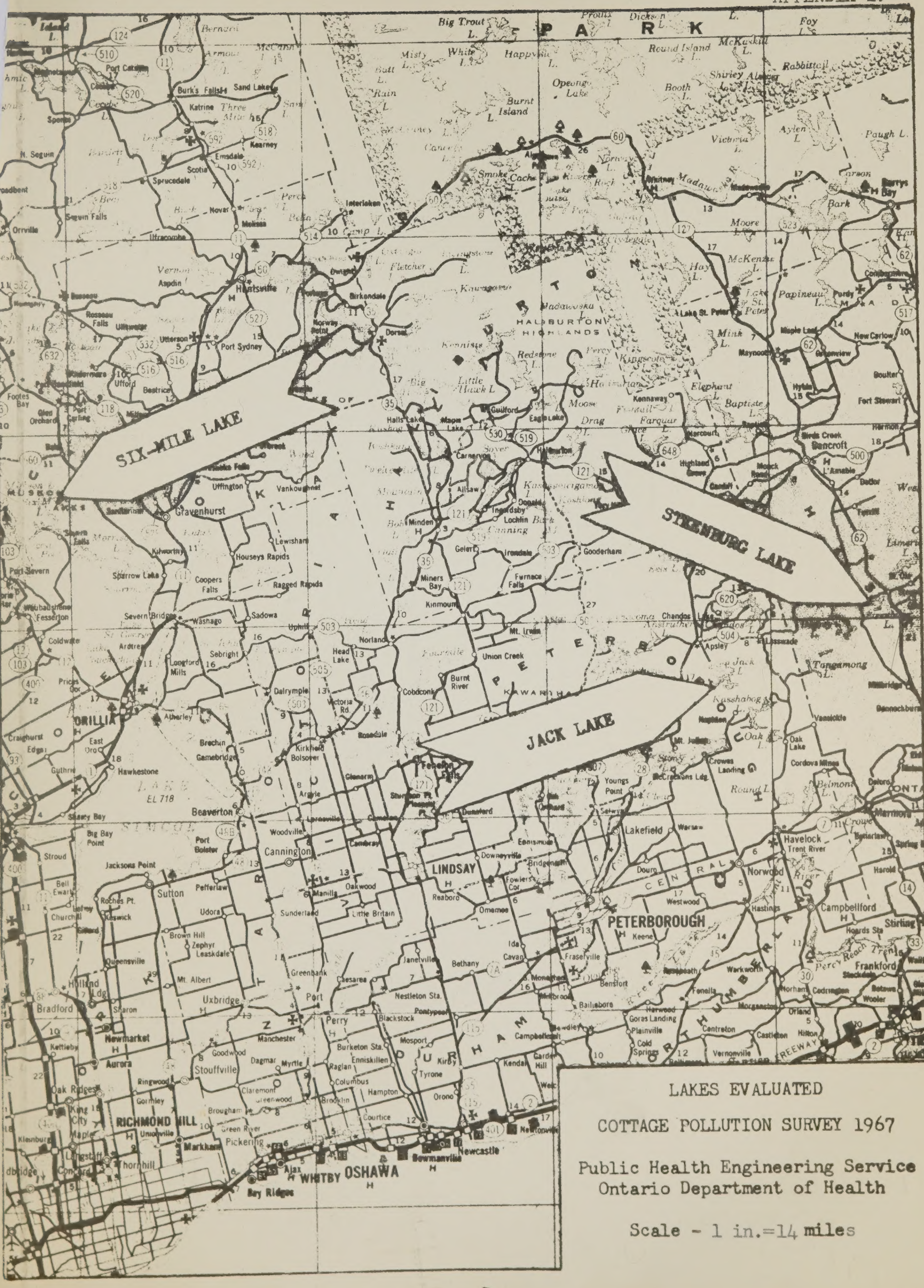
DESCRIPTION WHITE COTTAGE, BLACK ROOF



CURRENT MOVEMENT 8 FT/ 1 MIN

LABORATORY RESULTS

VOLUME OF WASTE WATER FLOW PER OCCUPANT PER DAY INTO LAKE	WASTE WATER INTO LAKE	DATE	TC/100 ml.	FC/100 ml.	BOD_5	NITROGEN		Phosphate	Suspended Solids
						AMMONIA	ORGANIC	PO_4	S.S
	SAMPLE NO. ___								
	___								
REFER TO SAMPLE NO. ___	___								
	___								
	___								
	___								
	___								
	___								
LAKE SAMPLE									
	SAMPLE NO. A	JULY 9	24,000	2400					
	B	JULY 9	230	230					
	A	JULY 18	230	23					
	B	JULY 18	240,000+	240,000+					
	CHEMICAL A	JULY 18			8.80	0.048	0.360	<1	2
	CHEMICAL B	JULY 18			8.90	0.024	0.180	<1	21.9
	___								
	___								



LAKES EVALUATED

COTTAGE POLLUTION SURVEY 1967

Public Health Engineering Service
Ontario Department of Health

Scale - 1 in.=14 miles